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MANAGERIAL ACCOUNTING

An Introduction

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MANAGERIAL ACCOUNTING

An Introduction

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Preface

There is probably no "one correct" method of teaching or studying accounting. Each teacher has his own ideas on how the student ought to be introduced to the accounting process, and each student has different objectives for studying accounting. The theory behind this text is that the principles of accounting and managerial uses of accounting are the two areas of the greatest interest to the beginning student. Students are often frightened away from accounting courses because of the large amount of "busy" work and because the significant controversies of accounting theory are hidden in a maze of detail or are postponed to a more advanced course. This text attempts to solve these difficulties. The reader will find that this text has little excess fat. In some areas the instructor may desire to supplement the text, but in general, the areas that receive reduced attention are materials which the average beginning accounting student does not learn and in which he has little interest. The subjects that have been de-emphasized in this text are bookkeeping techniques, accounting systems and procedures for handling paper, and auditing. These are admittedly important, but they should not be stressed in a beginning course in accounting. There are many students who are not interested in accounting as a career but as a tool of management. These students will benefit more by devoting their attention to the basic problems and theories of accounting. Students who desire to major in accounting will take courses in accounting systems and auditing, and the loss of the smattering of information they receive in a beginning course on these subjects should not harm them.

In an effort to develop an understanding of the basic theory of recording financial transactions, the author has included some material which many readers would consider to be of little or no managerial significance. Taken item by item, the material is not very significant (for example, petty cash transactions, recording sales, recording purchases, etc.). Any one of these topics could have been eliminated without harming the student's basic understanding. The problem is to decide which items should be eliminated. The student needs practice in translating financial transactions into debits and credits. He has to record a variety of situations, especially situations where there are both reasonable and unreasonable alternatives. While one or more of these seemingly petty problem areas could have been dispensed with, enough must be retained in order for the student to acquire a basic understanding of accounting. If the individual instructor feels that certain topics serve no purpose, he can teach around them. On the other hand, they are here for those instructors who find the topics helpful.

This book is divided into two parts. The division is designed to emphasize a slight shift in attention. In the first half of the book, attention is focused on financial accounting; in the second half, on managerial accounting. To be able to understand managerial problems of accounting, the reader must have a firm understanding of the theories of accounting, preparation of statements, and various accounting techniques. The study of these techniques is classified under financial accounting, not because it is any less important to a business manager, but because the subject is treated from a point of view of general financial significance, rather than of business decision-making. While the second half of the book is designed primarily for the business manager, by necessity some general accounting subjects have also found their way into this section. This, combined with the fact that many of the problems of managerial accounting also have implication for general financial reporting, means that both halves of the book are necessary for a well-rounded study of accounting.

If the teacher is faced with teaching a one-semester course, he may omit certain chapters. It is suggested that the following twenty-two chapters be considered seriously for retention: 2 through 7, 9, 11, 12, 13, 15, 17, 18, 19, 21, 22, 23, 24, 25, 31, 35, 36.

Acknowledgments

There is very little in this text which is "new." Where have the ideas come from? The list of acknowledgments is long and includes my teachers at the University of Michigan, teaching colleagues, friends in industry, and my questioning students. At the risk of neglecting many who have been helpful, I should like to mention the names of several who most significantly influenced my thinking.

My debt to William A. Paton is readily acknowledged, although I know better than to assume that he will agree with everything presented in this text. I also admit to being educated by my former colleagues at the University of Chicago, W. J. Vatter, David Green, Kullervo Louhi, and George Sorter. David Thomas and Joseph Hampton of Cornell University and Charles Horngren of the University of Wisconsin have also been of assistance in eliminating errors and inconsistencies.

Harold Bierman, Jr.

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I

Financial Accounting

1

Introduction to Accounting

Why Study Accounting? Why should accounting be studied by anyone but those who intend to make it a career? The majority who study accounting will not practice it, but there are valid reasons why this subject is important to them and worthy of being included in the curriculum for nonaccounting majors.

Accounting is the language of business and thus is the primary means of communicating business data. A person entering upon a business career, or many other careers using business data, should have a good grasp of accounting terminology and theory so that he may be better equipped to communicate with his fellow workers or to interpret reports containing accounting data.

Accounting may also be useful for developing a person's logic. This is difficult to prove, but at its best, accounting will help teach that problems may be solved in a logical systematic manner. If this skill in problem solving can be transferred to other areas, the study of accounting will have value as a training device as well as the inherent value it has as a means of communication.

The student of accounting should question each accounting procedure and ask, "Is this logical?" There will be cases where the procedure will not seem to be, but the fault will not be in the basic framework of accounting theory but rather in the fuzzy thinking of those who have failed fully to develop the potential of accounting.

What Is Accounting? *Accounting* is a term used to describe a wide range of techniques and fields of study. The tasks of an accountant cover such diverse areas as:

Recording of Financial Transactions
Reporting the Results of Financial Transactions

Preparing Reports for Management for Control Purposes
Preparing Reports for Government (including the income tax form)
Checking the Recording and Reporting of Financial Data (auditing)
Interpreting Financial and Managerial Reports
Setting Up Systems for Recording Financial Transactions
Determining and Controlling the Cost of Products and Processes

There are few persons who are not exposed to the accountant's work in one form or another. The following examples illustrate some of the typical uses:

Investor—annual and quarterly reports of income and financial position
Lawyer—numerous cases hinge on accounting theory, especially in the fields of public utilities, mergers, liquidations, etc.
Economists (and other scholars)—the information pertaining to the income of the corporate sector of the economy is based on accounting reports.
Government Administrators—this group is similar in function to business managers. They must use accounting reports to determine financial position, control costs, etc.

The preceding list is by no means all-inclusive (it excludes organized labor, creditors, etc.). In one way or another we are all affected by the work of the accountant, but the group which is most interested in the accountant's reports is that of the business manager. Management relies on the accountant to keep it informed. The more complex the business enterprise, the more management must rely on accounting reports. It is literally impossible for a person, no matter how skilled, to judge how well a large enterprise is doing unless he examines the reports of the accountant. These reports are based on the summary of the financial transactions recorded according to generally accepted accounting principles or adjusted as necessary for managerial purposes. These summaries tell management:

The results of the operations (the income or the loss)
The financial position of the enterprise
The areas of inefficiency
The sources and uses of funds
The projected results of the operations of future periods.

General Financial Statements. The three primary financial statements are the position statement (also called balance sheet), income statement, and the funds statement. The function of the position statement is to present the financial position of the enterprise *as of* a moment in time. It accomplishes this goal by presenting resources owned by the firm (the assets), the amount of debts (the liabilities), and the rights of the stockholders (the stockholders' equity). The success with which the accountant succeeds in presenting the financial position of the firm is, of course, limited by the information available to him. The position statement is prepared from the accounting records, and any limitations of the general accounting framework affect the financial reports. Thus the position statement of a firm, rather than showing the financial position of the firm from an economic or a liquidation point of view, is a reflection of what has been recorded by the accountant. This fact is equally true of the other accounting reports.

The income statement shows the results of operations for a period of time by measuring the difference between the dollar value of resources received by the firm (the measure of this amount is called *revenue*) and the recorded cost of the assets given up in earning the revenues (the measure of this amount is called *expense*).

The funds statement is a presentation of the sources and uses of funds for a period of time. The term *funds* has a technical accounting meaning, but the reader at this point may interpret funds to mean assets of a liquid nature (meaning that it is relatively easy to turn them into cash). The funds statement is an extremely useful report which in recent years has increased in importance. One reason for its growth in popularity is that it bypasses several problems of measurement which would affect the income statement but which will not affect the funds statement (for example, several expenses of using a long-lived asset will affect the income of the period but will not affect the funds statement, since they do not use funds in the period in which the revenues are earned).

It is common for a large corporation partially or completely to own other corporations. If the percentage of ownership of these subsidiary corporations is large, the financial data of the parent corporation are frequently combined with those of the subsidiary corporations; *consolidated financial statements* are then prepared. Thus we shall encounter statements titled "Consolidated Statement of Financial Position" or "Balance Sheet for XYZ Corporation and Subsidiaries."

Financial statements will frequently show data for more than one year. These are called *comparative* statements and are extremely valuable to a person making use of the information because the changes from period to period may be noted.

GENERAL MOTORS

CONSOLIDATED
DECEMBER 31,

Assets

CURRENT ASSETS:	DEC. 31, 1956	DEC. 31, 1955
Cash	$ 371,271,749	$ 376,516,274
United States and foreign government securities—short term—at cost	300,924,985	833,966,763
Accounts and notes receivable (less allowance for doubtful accounts: 1956—$1,850,466; 1955—$2,146,684)	570,733,567	580,437,319
Inventories	1,719,592,723	1,601,654,593
TOTAL CURRENT ASSETS	2,962,523,024	3,392,574,949
INVESTMENTS AND MISCELLANEOUS ASSETS		
Investments in subsidiary companies not consolidated	335,556,322	306,299,648
Other investments	17,645,072	19,830,786
Miscellaneous assets	89,087,853	95,609,900
TOTAL INVESTMENTS AND MISCELLANEOUS ASSETS	442,289,247	421,740,334
COMMON STOCK IN TREASURY:		
Held for bonus purposes (1956—2,402,755 shares; 1955—2,776,008 shares)	89,291,992	84,065,656
REAL ESTATE, PLANTS, AND EQUIPMENT	5,271,815,966	4,354,352,101
Less accumulated depreciation and obsolescence	2,304,003,607	2,001,320,458
NET REAL ESTATE, PLANTS, AND EQUIPMENT	2,967,812,359	2,353,031,643
PREPAID EXPENSES AND DEFERRED CHARGES	44,041,648	29,917,113
GOODWILL, PATENTS, ETC.	63,442,466	63,442,466
Total assets	$6,569,400,736	$6,344,772,161

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* Courtesy the General Motors Corporation.

CORPORATION *

BALANCE SHEET
1956 AND 1955

Liabilities, reserves, and capital

	DEC. 31, 1956	DEC. 31, 1955
CURRENT LIABILITIES:		
United States and foreign income taxes	$ 899,937,634	$1,383,309,272
Less United States and foreign government securities	830,950,320	1,328,583,800
Net liability	68,987,314	54,725,472
Accounts payable	596,006,157	569,236,590
Taxes, payrolls, and sundry accrued items	548,323,231	707,122,980
Dividends payable on preferred stocks	3,232,076	3,232,076
TOTAL CURRENT LIABILITIES	1,216,548,778	1,334,317,118
OTHER LIABILITIES—Employes bonus, taxes, warranties, and miscellaneous	265,062,428	227,697,967
3¼% DEBENTURES DUE 1979	300,000,000	300,000,000
RESERVES:		
Employes benefit plans	27,258,998	24,004,869
Employes bonus (balance carried forward)	19,801,413	19,791,700
Deferred income	6,567,598	6,330,791
Reconversion and plant rehabilitation costs incident to the defense emergency	—	17,607,000
General reserve applicable to foreign operations	141,667,396	141,667,396
Miscellaneous	8,511,671	15,907,331
TOTAL RESERVES	203,807,076	225,309,087
MINORITY INTEREST—Preference stocks of foreign subsidiaries	2,392,265	2,392,265
CAPITAL:		
Capital Stock:		
Preferred, without par value (authorized, 6,000,000 shares):		
$5.00 series, stated value $100 per share (issued, 1,875,366 shares; in treasury, 39,722 shares; outstanding, 1,835,644 shares)	183,564,400	183,564,400
$3.75 series, stated value $100 per share (issued and outstanding, 1,000,000 shares)	100,000,000	100,000,000
Common, $1⅔ par value (authorized, 500,000,000 shares; issued, 279,821,123 shares at December 31, 1956 and 278,834,250 shares at December 31, 1955)	466,368,538	464,723,750
TOTAL CAPITAL STOCK	749,932,938	748,288,150
Capital surplus	405,076,147	361,800,988
Net income retained for use in the business (earned surplus)	3,426,581,104	3,144,966,586
TOTAL CAPITAL	4,581,590,189	4,255,055,724
Total liabilities, reserves, and capital	**$6,569,400,736**	**$6,344,772,161**

GENERAL MOTORS CORPORATION *

STATEMENT OF CONSOLIDATED INCOME
FOR THE YEARS ENDED DECEMBER 31, 1956 AND 1955

	YEAR 1956	YEAR 1955
NET SALES	$10,796,442,575	$12,443,277,420
Equity in earnings of subsidiary companies not consolidated (dividends and interest received amounted to $31,549,368 in 1956 and $27,190,983 in 1955)	57,194,136	45,613,061
Other income less sundry income deductions	55,921,601	43,598,766
TOTAL	10,909,558,312	12,532,489,247
LESS:		
Cost of sales and other operating charges, exclusive of items listed below	8,235,775,717	9,129,195,774
Selling, general, and administrative expenses	489,419,193	461,837,722
Interest and amortization of discount on 3¼% debentures	9,833,230	9,833,230
Provision for:		
Depreciation and obsolescence of real estate, plants, and equipment	347,210,484	293,795,082
Employes bonus	85,905,078	95,000,000
United States and foreign income taxes	894,018,508	1,353,350,357
TOTAL	10,062,162,210	11,343,012,165
NET INCOME for the year	847,396,102	1,189,477,082
Dividends on preferred stocks	12,928,302	12,928,305
AMOUNT EARNED ON COMMON STOCK	$ 834,467,800	$ 1,176,548,777
Average number of shares of common stock outstanding during the year	276,374,733	273,512,806
AMOUNT EARNED PER SHARE OF COMMON STOCK	$3.02	$4.30

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* Courtesy the General Motors Corporation.

Accounting as a Profession. The practice of accounting is broken up into two general fields:

Private Accounting
Public Accounting

The private accountant is hired by a firm engaged in manufacturing, merchandising, etc., and is actually in the employ of the firm for which he is rendering the service. The controller of a large corporation is a private accountant, as is a payroll clerk.

The public accounting profession includes certified public accountant firms primarily interested in auditing, but these firms are also capable of offering a variety of other services. They are "independent," since the firms are hired on a fee basis and are not in the regular employ of the enterprise making use of their services. True independence is a matter of integrity, not of the method of payment for services rendered.

The public accounting profession has created a system of certifying those who possess a proven amount of professional skill. Thus we have the Certified Public Accountant, a title that is earned by passing an examination and by satisfying certain requirements of education and experience. Each state has different requirements; therefore, a prospective candidate should check the requirements for the state in which he is interested. Business libraries will usually have this information.

Business Enterprises. The work of the accountant is not limited to business enterprises; many thousands of accountants work in governmental units, educational, charitable institutions, etc. But it is in the business area where the majority of the accounting work is performed. There are three primary forms of organization which may be utilized to run a business. These are:

Proprietorship
Partnership
Corporation

The single proprietorship form of organization is the most numerous and includes most retailers, farmers, doctors, etc. However, in terms of importance (sales and assets), the corporate form outstrips all others. The advantages of the corporate form (limited liability, continuity of existence, ease of raising money, organizational advantages, etc.) are such that practically every large business enterprise is organized as a corporation. For this reason the author will use corporations and their problems as the foundation for this text. The specialized problems of partnerships are considered to be outside the scope of this course, but the majority of accounting techniques and theories are uniform for all business, regardless of type of organization.

Accounting Conventions and Accounting Theories. Accounting conventions and accounting theories are constantly evolving. Though the conventions and theories are in general agreement, in some areas accounting conventions may differ somewhat from accounting theory.

The accounting conventions have been built up through the years and have been given semi-official status by the society of professional accountants (The American Institute of Certified Public Accountants). The Institute publishes a series of Accounting Research Bulletins which are sound references for current accounting conventions.

There is no one source of accounting theories, although textbooks, journal articles, speeches, and pronouncements of professional organizations are all foundations of accounting theory. Good accounting theory will be both reasonable and useful. Usefulness includes the practicality of incorporating the theory into the accounting system. Some theories must await the passage of time before they are "proven" and can then become acceptable conventions. The study of both accounting convention and theory is important, since it is necessary to know what the accountant is currently doing and what he may do in the future.

Limitations of Accounting. One of the most important by-products resulting from the study of accounting is an appreciation of its limitations as well as its uses. Some accountants claim the status of science for accounting, but whether accounting is a science or an art is relatively unimportant compared with the more important question of whether the accounting procedure under consideration is "scientific" in the best sense of the word. It is well for a person using accounting information to know and recognize those areas where the accounting techniques are something less than scientific and where the results are less than "absolutely" correct. A logical place to start is with the framework of accounting.

Framework of Accounting. When an accounting entry is made or a report prepared, the accountant is operating within a framework. This framework of accounting consists of items that have been variously described as postulates, concepts, principles, or standards. No matter what they are called, they are the basis of accounting practice. Many of the terms will mean little at this point, but they will increase in significance as the reader becomes more conversant with the techniques of accounting.

The importance of an understanding of the framework of accounting cannot be overstressed. Why is a transaction recorded in a certain manner? Why is a financial statement prepared in a certain form? These questions may frequently be answered by reference to the framework of accounting.

The generally accepted framework of accounting comprises:

1. Accounting reports the financial position and results of operations of the business entity, not the owners (this is referred to as the entity theory).
2. Accounting records and reports the stewardship (supervision) of management and the board of directors.
3. The corporate entity possesses a continuity of existence.
4. Costs are matched with appropriate revenues.
5. Objective evidence is the basis of recording transactions.
6. There is a stable measuring unit, the dollar.
7. Conservatism is desirable.
8. Consistency is desirable.
9. The accounting treatment of an item depends on whether the item is *material* in size.
10. Revenues or special gains are recognized only when realized.
11. It is possible to determine income for different calendar periods and financial position as of different moments of time.

The remainder of this chapter will attempt to introduce the reader to the items listed, but to be digested fully, this section should be reread after the entire text has been studied. This section is both an introduction and review.

Entity Theory—Stewardship Function—Going-Concern Concept. The first three items will be discussed as a group, since they are all related to the entity theory. The corporation is a separate entity, and the accounting framework takes this into consideration. The corporation itself is a being, an entity that exists by virtue of its charter and the laws of the land. The accountant focuses attention on this entity and generally records business transactions as they affect the corporation. However, the entity concept is not strictly adhered to, and the alert student of accounting will find places where the entity concept is not used.

The stewardship function of accounting has at times prevented other uses of accounting from becoming established. It is generally argued that the stockholders of a corporation hire the board of directors and management as "stewards" to administer the corporate assets, and the primary function of accounting is to record the results of this stewardship. Certainly this is one function of accounting. It is unfortunate when this one function tends to become the sole function of accounting.

The going concern concept of accounting is related to the fact that the corporation usually has a charter with no terminable date. Thus the life of the corporation seems to extend into perpetuity. This assumption of perpetuity is the basis of the accounting treatment of many transactions. For example, the accountant generally ignores liquidation values of assets because the firm presumably is not going to be liquidated.

Matching Principle. Costs should be matched with the revenue which they help earn. The matching of costs and revenue is one of the more thought-provoking areas of accounting. The longer the life of the asset, the more difficult it is to match the cost of the asset with revenues which it helps earn. Thus the costs of buildings and equipment will be written off as expenses against the revenues earned throughout their useful life, but at the time of purchase it is frequently impossible to forecast the number of years of use. Even if the number of years of use is known with certainty, how much of the cost of the asset should be an expense of any one year? A faulty matching of revenues and the expenses of earning those revenues will result in a misstatement of income; thus it is important that this principle be applied with honest and considered judgment.

Objective Evidence—Stable Monetary Unit. It is generally accepted that objective evidence should be the accounting basis for recording transactions. There is less agreement as to what is meant by the statement "objective evidence." For example, in the post World War II period the price inflation (decrease in the value of a dollar) has tended to cause the accounting presentation of long-lived assets (such as buildings and equipment) to be unreliable because the cost of the assets are reported in dollars of the year of purchase and not adjusted to reflect the inflation. The advocates of the accepted procedure have argued that objective evidence with which to make adjustments is lacking.

The demand for objective evidence before making adjustments for the change in the price level has caused accountants to follow an implicit assumption that there is a stable monetary unit (that the dollar does not change in purchasing power). Accountants as individuals realize that the value of the dollar does fluctuate. As a group they have decided at the present time not to take action toward incorporating this fact into the accounting records.

The desire for objective evidence goes beyond the accounting problems of changes in the price level. It explains the recording of many transactions. For example, the acquisition of patents requires evidence of economic value before they can be recorded as assets. If the corporation gives up cash, or other assets of readily determinable value in exchange for the patents, the cost of the patents will be accepted as evidence that the patents have value. Lacking objective evidence of value (the cost cannot be determined), the accountant would be reluctant to record the patents as an asset.

Conservatism. Conservatism is often substituted for the more praiseworthy goal of accuracy. "Conservatism is good." If the accounting treatment of a situation is conservative, is it necessarily good? Conservatism usually means recording assets owned at as low a value as possible. While this may seem to be conservative, the end result may be anything except conservative. The next period's income may be overstated, or worse yet, the return on investment (income divided by the total assets) may be greatly overstated because of the low, recorded dollar value of assets.

Conservatism in its place is desirable, but its place in accounting should be ranked behind intelligent and sensible recording of business transactions.

Consistency. The accountant seeks consistency when reporting in successive periods, and this is generally desirable. Corporations cannot be allowed at will to change accounting procedures from accounting period to accounting period, thus manipulating the end result. On the other hand, if a mistake has been made, it may be better to correct it than to continue the mistake for the sake of consistency.

Materiality. Whether an item is material or not will to some extent affect its accounting treatment. Thus, long-lived assets such as buildings are treated as assets throughout their useful life. Should a pencil sharpener be treated in the same manner? The building may cost $1,000,000, the pencil sharpener $1.98. Obviously a line has to be drawn. An item below a certain cost will be charged as an expense in the period of purchase, even though it may have a life in excess of one year. The justification for the treatment is the criterion of materiality.

Realization Principle. Revenues or special gains should not be recognized in the accounting records unless they are realized. When is a gain realized? There is no simple answer to this question, but, generally speaking, gains are not realized (or recognized) until the entire series of events have occurred which caused the gain to come into being. This requirement is also *conservative,* since it prevents the recognition of gains before they are completely earned.

Frequently the accountant will recognize losses even though they have not been realized. For example, if a pound of flour (in stock) had cost $1, but the price dropped and it could now be bought for 60¢, it would be permissible to recognize the loss of 40¢. However, if the flour increased in price and the purchase price became $1.20, it would not be permissible to recognize the gain of 20¢ because the gain had not been realized by selling the flour. This procedure is justified as being *conservative* (recognize all losses, but do not recognize gains until they are realized).

Accounting Periods. The accountant attempts to determine income for calendar periods of time and to determine financial position at specific calendar dates. This is at best a difficult task, and the accountant is not always successful. Some problems have already been illustrated in the sections on matching, conservatism, materiality, and realization. The longer the time period, the more reliable is the accountant's work likely to be. If the time period becomes too short, the report of income tends to lose significance.

Summary. The reader has probably found much in this section which he does not completely understand. He would do well to return to this chapter as he reads through the text, since the methods used by the accountant to record business transactions are based on the framework described in the preceding pages.

QUESTIONS AND PROBLEMS

1–1. What form of business organization would you expect the following "industries" to take? Why?

- (a) Steel industry
- (b) Law
- (c) Retailing
- (d) Farming

1–2. What types of report does an accountant prepare?

1–3. What groups of people would be interested in the reports of the accountant? How would they use the reports?

1–4. In what ways may a business manager use accounting information?

1–5. The two general areas of accounting are public accounting and private accounting. Describe what is meant by each term.

1–6. What are the CPA requirements in the state in which you live? In the state where you are going to school?

1–7. The term *accounting conventions* is often used to describe the generally accepted accounting practices. These conventions are not always theoretically sound or logical. Name some conventions in areas other than accounting, which are not logical, or at least have no theoretical justification. (For example, a gentleman should walk on the outside if he is escorting a lady.)

1–8. The XYZ Company has listed on one of its financial reports (statement of financial position) "Buildings, $451,000." Refer to the list of items making up the framework of accounting and state whether you would accept this as a significant figure. Explain.

1–9. The XYZ Company has listed on one of its financial reports (statement of operating income) "Depreciation, $50,000." A note explains that depreciation expense measures the cost of using the long-lived assets during the accounting period. State whether you would accept the $50,000 as a significant figure. Explain.

2

The Position Statement

UNTIL RECENTLY THE financial statement referred to in this book as the *position statement* was exclusively known as the *balance sheet.* The two terms refer to the same report and are now used interchangeably. It should be noted that the position statement will not reflect the present financial position of an enterprise but rather the status of the accounting records. The reasons why accounting records may not be in agreement with present values will be investigated in later chapters. These reasons are related to the framework of accounting presented in the first chapter.

The reader should be alert to the fact that many words are used by accountants which have meanings different from those of the same words used in everyday usage. Such words as *surplus, reserve, debit,* and *credit* all have special meaning to the accountant. Another difficulty may arise because several terms may have the same meaning. An example of this are the terms *position statement* and *balance sheet.* Both terms refer to the same type of report.

Definition of "Position Statement." A position statement is a statement of the financial status of the firm *as recorded by the accountant.* It gives a *picture* at a particular moment in time. It tells nothing of how the firm arrived at this situation, but it does tell where the firm is as of the date of the statement (within the limitations of the accounting records).

To accomplish its function, the position statement must show the assets of the firm, the debts owed, and the rights of the owners. The total rights to the assets must, by definition, be equal to the assets. The claims of the owners are a residual, equal to the difference of the sum of the assets and the total liabilities.

$$\text{Claims of owners} = \text{assets} - \text{liabilities}$$

This equation may be transposed so that the total claims of creditors and owners are equal to the total assets.

Claims of owners + liabilities = assets

or

Assets = claims of owners + liabilities

The term *equity* is often substituted for *claim.* Thus we speak of "owners' equity" and "creditors' equity." The total "equities" are equal to the total assets. Thus we have one basic equation and three expressions of it.

I Assets = equities
II Assets = owners' equity + creditors' equity
III Owners' equity = assets — creditors' equity

The terms *liabilities* and *creditors' equity* may be used interchangeably.

Form of Position Statement. The position statement is merely an elaboration of the equations I, II, and III. Since there is equality between assets and equities, they may be arranged in a balanced array presentation. This is the origin of the term *balance sheet.*

Illustration

A firm has cash of $5,000 and material that cost $6,000, and owes $3,000. The position statement in its simplest form would appear as follows:

COMPANY X
POSITION STATEMENT
AS OF DECEMBER 31, 19—

Assets		*Equities*	
Cash	$ 5,000	Liabilities	$ 3,000
Material	6,000	Owners' Equity	8,000
Total Assets	$11,000	Total Equities	$11,000

The position statement has a heading containing three items. First the name of the company, then the name of the report, and finally the date for which this statement is applicable. Note that this statement is "*As of* December 31, 19—." This is important since it stresses the fact that the statement is for a particular moment in time.

The body of the statement has two main sections, the "Asset" and the "Equity" sections. The total assets must equal the total equities. In the preceding example the equality was assured by the procedure used in computing the owners' equity. The owners' equity was computed by subtracting the total liabilities from the total assets. In actual accounting practice the owners' equity would not be computed in this manner, although the relationships are valid. The equality is actually used as a check rather than as a means of obtaining the amounts.

The equity section of the position statement is sometimes labeled "Liabilities and Owners' Equities." This is equally correct. It is somewhat longer than the term "Equities," but it is also more descriptive. Unfortunately the equity side is also labeled "Liabilities" by some accountants. This is incorrect because the rights of the owners should not be classified as liabilities. The right-hand side of the position statement consists of two basic types of claims, the claims (or rights) of the owners and the claims of the creditors.

Equality of Assets and Equities. The fact that assets must *always equal* equities (the rights of the creditors and owners) is sometimes difficult to realize. If a firm owns an asset, that asset is balanced by equal claims against the asset. Thus, if a stockholder contributes $100, the assets of the firm are increased by $100, as are the claims of the stockholders.

Each asset coming into a firm has a source. The source of the asset is recorded as an equity, and the sources of the assets must be equal to the assets owned by the firm. If material is purchased on account (the purchase price is still owed), the source of the asset is the trade creditor to whom the money is owed, and the rights of this party are recorded as an equity item, a current liability. The sources of assets, or rights to the assets of the various parties with claims, cannot be less than, or more than, the total assets. This equality of assets and claims to the assets (equities) can never be upset.

Definition of the Term "Assets." Trying to define the term *assets* is a difficult task. The problem is to reconcile the definition with usage and not to get too far removed from good accounting theory. The following definition is offered as a working rule.

Assets are the resources owned by the business entity, both intangible and tangible, plus cost factors which have been incurred, but which are applicable to the revenues of future periods.

Examples of assets are:

Tangible Resources: land, buildings, equipment, inventories, cash, receivables from customers

Intangible Resources: patents, goodwill

Cost Factors Applicable to Future Periods: stock issue costs, bond issue costs, advertising costs which have been incurred and which are expected to benefit the next period of sales.

For certain purposes the preceding definition of assets will not be useful. For example, it may be desirable to think in terms of the present value of future services if you are attempting to determine the over-all value of an enterprise's assets. Costs incurred, which are applicable to future periods, would not be relevant unless they would influence the determination of future revenues. This highlights the need for flexibility in working with accounting data. The definition chosen by the accountant may have to be adjusted to fit the specific need for information.

Classification of Assets. The basic division of the asset section of the position statement is into two sections, "Current Assets" and "Fixed Assets." Current assets are cash, items that can be readily turned into cash, or assets which will be used in a year or in the operating cycle of the firm, if the operating cycle is somewhat more than a year. *Operating cycle* refers to the average time it takes to convert raw material into a finished product, sell it, and collect the cash. Many companies prefer to use a year as the determining factor rather than attempt to compute (or define) the operating cycle applicable to their operations.

Current assets include such things as the cash on hand or in the bank, receivables from customers (accounts receivable), materials, supplies or goods on hand (inventories), readily marketable securities (marketable securities), advance payments of insurance, and rent, and the like (called *prepaid expenses*).

Fixed assets are assets with a life greater than a year and which cannot readily be turned into cash without disrupting the normal business operations. This means that a building, even though it could be sold, is not a current asset if it cannot be sold without disrupting the normal course of business. On the other hand, an investment in common stock of an uncontrolled corporation would not be considered a fixed asset because it could be sold without disrupting operations.

Fixed assets include land, buildings, and equipment when these items are used in operations. Their common characteristic is one of long life. In certain industries equipment will be considered inventory (for example, the inventory of a machine tool dealer).

Some assets do not fit neatly into either of the two classifications given. These items are either placed between current and fixed assets (investments are treated in this manner) or placed below the fixed assets (patents, trademarks, goodwill, and other intangible assets are treated in this manner).

The distinction between marketable securities and investments should be noted. Marketable securities are investments for which there is a ready market and which are *not* being held for control purposes. Investments refer to securities being held for control purposes and therefore not likely to be sold.

Classification of Equities. The equity side of the position statement has two main divisions and several subdivisions. The basic division is into "Liability" and "Stockholders' Equity" sections. The liabilities are divided into current and long-term liabilities. The stockholders' equity section has several subdivisions, but essentially it is divided into "Capital Received from Stockholders," (capital contributed by stockholders), and "Retained Earnings" (earnings retained for use in the enterprise).

Current liabilities include amounts owed to trade creditors (accounts payable), workers (wages payable), government (taxes payable), investors (interest or dividends payable), and customers (advances by customers). All are liabilities due within a year (or within the operating cycle of the firm).

Long-term liabilities include amounts which are owed but do not have to be paid within a year. The most common long-term liabilities are bonds, mortgages, and notes. If part of these items is due within 12 months, that amount should be classified as a current liability.

The retained earnings balance (sometimes called "Earned Surplus" or "Surplus") is equal to the sum of the past earnings of the enterprise minus any dividends which may have been paid. The capital received from stockholders is equal to the amount contributed by the stockholders and is usually divided into several accounts. This technicality will be ignored for a few chapters, and the entire amount will appear as "Capital Received from Stockholders."

Sample Position Statement. The position statement illustrated here is not complete in all details, but it does show the basic arrangement for a position statement. This statement will be expanded in later chapters, but it will not be basically changed. Note that current assets are listed in order of liquidity. In preparing a position statement the arrangement of the items and the appearance of the statement is important. The reader will expect to find items in specific locations, and the person preparing the report should either conform to current practice or warn the reader of differences in presentation.

SAMPLE COMPANY
POSITION STATEMENT
AS OF DECEMBER 31, 19—

Assets

Current Assets		
Cash on Hand	$ 2,000	
Cash in Bank	30,000	
Marketable Securities	8,000	
Accounts Receivable	60,000	
Inventories	50,000	
Prepaid Expenses	2,000	
Total Current Assets		$152,000
Investments (Stock of Controlled Corporations)		40,000

Fixed Assets			
Land		$15,000	
Buildings		53,000	
Equipment		20,000	
Total Fixed Assets			88,000
Total Assets			$280,000

Equities

Current Liabilities			
Accounts Payable	$30,000		
Taxes Payable	70,000		
Total Current Liabilities		$100,000	
Long-Term Liabilities			
Bonds Payable		80,000	
Total Liabilities			$180,000
Stockholders' Equity			
Capital Received from Stockholders		$90,000	
Retained Earnings		10,000	
Total Stockholders' Equity			100,000
Total Equities			$280,000

Managerial Uses of the Position Statement. The primary function of a position statement is to indicate the financial position of the organizational unit. A bank considering a loan to a corporation obviously would want to know the financial position of the corporation as of the date of the loan (or as close to that date as possible). The primary internal use of a position statement is very similar. Management uses the position statement as a means of measuring the soundness of the financial position of the firm. If the raising of more capital is being considered, the position statement will help management to make a rational decision as to the type of capital (debt or stock equity) which should be sought.

By looking at the statements for successive periods, management can observe changes in specific items. If the direction and the amount of the change is undesirable, management can often take action to correct the situation. For example, an increase in accounts receivable (the amounts owed by the customers to the company) may indicate inefficiency in the operation of the collection department. While individual items such as accounts receivable will be the subject of separate reports, it is helpful when all assets and equities are collected in one display so that the various items may be readily compared with each other.

Position statements prepared for management should be designed especially for the executives to whom they are being sent. Top management has no need for statements showing pennies; in fact, very large companies round off the dollars to the nearest hundred thousand or million dollars. Reports may also be simplified by combining similar items. Thus prepaid expenses may include prepaid rent, insurance, taxes, etc. The aim of these simplifications is to save time when executives review the statement and to avoid overwhelming them with too extensive an array of numbers.

The most important thing to remember in preparing position statements for managerial use is that a report prepared in accordance with generally accepted accounting techniques may not be useful for decision-making. This means that the conventional position statement may have to be adjusted before it can be helpful to management.

QUESTIONS AND PROBLEMS

2–1. The assets of a corporation total $10,000; the liabilities, $4,000. The claims of the owners are ________.

2–2. The assets of a corporation total $10,000; the claims of the owners are $7,000. The total liabilities are ________.

2–3. The liabilities of a corporation are $3,000; the claims of the owners are $6,000. The total assets are ________. Total equities are ________.

2–4. Give the relationship of assets, liabilities, and owners' equity in three different equations (solve for each of the above items).

2–5. The Abbey Corporation

From the following information, presented as of December 31, 1957, prepare a position statement in good form:

Liabilities	$6,000
Cash	5,000
Materials	4,000
Buildings	9,000

2–6. The Abelard Corporation

From the following information, presented as of December 31, 1957, prepare a position statement in good form.

Accounts Payable	$ 30,000	Wages Payable	$60,000
Cash on Hand	2,000	Marketable Securities	10,000
Cash in Bank	125,000	Accounts Receivable	40,000
Inventories	80,000	Buildings	60,000
Land	20,000	Prepaid Expenses	1,000
Bonds Payable	150,000	Capital Received from Stockholders	50,000
Retained Earnings	?		

2–7. The Acton Corporation

From the following information prepared as of December 31, 1957, prepare a position statement in good form.

Bonds Payable	$ 50,000	Wages Payable	$ 3,000
Land	10,000	Capital Received from Stockholders	40,000
Inventories	40,000	Prepaid Expenses	2,000
Cash in Bank	105,000	Buildings	60,000
Cash on Hand	1,000	Accounts Receivable	10,000
Accounts Payable	30,000	Marketable Securities	30,000
Taxes Payable	20,000		
Retained Earnings	?		

2–8. The Addison Corporation

The Addison Corporation has been operating for a period of years. In October, 1957, the accountant of the company disappeared, and with him disappeared the records of the company.

You are hired to reconstruct accounting records, and with this in mind you make an inventory of all assets which the company owns. By checking with banks, counting materials on hand, investigating ownership of buildings, equipment, etc. you find the following information:

	Balance or Market Value as of November 30, 1957
Cash on Hand	$ 3,000
Cash in Bank	53,000
Inventories	14,000
Accounts Receivable	10,000
Marketable Securities	5,000
Land	15,000
Buildings	20,000
Equipment	25,000

Bills received from creditors and invoices found in the office indicate that $40,000 is owed to trade creditors. There is a $10,000 long term mortgage (20 years) outstanding.

Interviews with the board of directors and a check of the common stock record book indicate that there are 1,000 shares of common stock outstanding and that the stockholders have contributed $30,000 to the corporation. There is no record available as to the history of past earnings or dividend payments.

Required: Prepare a position statement for the Addison Corporation as of November 30, 1957.

2–9. The Adler Corporation

From the following information, obtained as of December 31, 1957, prepare a position statement in good form.

Accounts Payable	$ 10,000	Land	$10,000
Dividends Payable	4,000	Equipment	60,000
Cash	20,000	Accounts Receivable	15,000
Marketable Securities	10,000	Interest Payable	1,000
Investments	40,000	Merchandise	18,000
Bonds Payable	50,000	Supplies	2,000
		Buildings	50,000
Capital Received from Stockholders	100,000	Retained Earnings	?

2–10. It is sometimes stated that the asset side of a position statement should include the rights in property, both tangible and intangible, of a business enterprise. Accepting this statement, discuss whether the following items should be included among the assets:

(a) Investment in government bonds
(b) Investment in corporate bonds
(c) Prepaid expenses
(d) Costs of drilling for oil
(e) Advertising costs connected with selling a new product (not yet offered for sale)
(f) Costs of organizing a new corporation
(g) Costs connected with issuing bonds
(h) Costs of installing a piece of equipment.

3

Recording Transactions Directly to the Position Statement

THE STATEMENT THAT each financial transaction is recorded twice has resulted in the name "double entry bookkeeping." The basis of accounting is not the recording of transactions twice but rather the recording of each transaction completely. Accounting theory recognizes that each transaction has two sides; thus at least two items are affected by each transaction. If you buy a suit and pay cash, your cash is decreased, and the investment in suits increases. If a debt is paid by a firm, the cash decreases and the liability decreases. There is no financial transaction that does not affect at least two items.

Corporations are formed to provide a service or product, and when this service or product is sold, assets come into the firm. The measurement of those assets is called *revenue,* and the entire transaction is called a *revenue transaction.* A part of the revenue transaction is the recognition that some asset values expired in the earning of the revenues. The decrease in assets is called *expense.* The difference between the revenues and the expenses of a period is the *income* of the period.

Sample Transactions. In this chapter each financial transaction will be recorded directly to the position statement. After each transaction a new position statement will be prepared. Thus the financial position of the firm will be known at all times.

Transaction 1. Stockholders invest $10,000 in the Sample Company.

Assets		*Equities*	
Cash	$10,000	Capital Received from Stockholders	$10,000

Transaction 2. The company buys $5,000 of merchandise; the payment must be made in 30 days.

Assets		*Equities*	
Cash	$10,000	Accounts Payable	$ 5,000
Merchandise	5,000	Capital Received from Stockholders	10,000
	$15,000		$15,000

Transaction 3. The company buys a building for $20,000, pays $4,000 cash, and issues bonds for the balance ($16,000).

Assets		*Equities*	
Cash	$ 6,000	Accounts Payable	$ 5,000
Merchandise	5,000	Bonds Payable	16,000
Building	20,000	Capital Received from Stockholders	10,000
	$31,000		$31,000

Transaction 4. The merchandise (see Transaction 2) is paid for.

Assets		*Equities*	
Cash	$ 1,000	Accounts Payable	$ ____
Merchandise	5,000	Bonds Payable	16,000
Building	20,000	Capital Received from Stockholders	10,000
	$26,000		$26,000

Explanation of Entries. Transaction 1 illustrates a situation where both assets and equities increase. The cash increases by $10,000, as does the capital received from stockholders (representing the investment of the stockholders).

Transaction 2 also illustrates a situation where both assets and equities increase, but here the equity is a current liability. The asset (merchandise) is increased by $5,000, as is the liability, accounts payable (the amount owed to a trade creditor).

Transaction 3 is a slightly more complex entry. There is an increase in one asset, a decrease in another, and an increase in long-term liabilities. Building costs increase by $20,000, and this is balanced by a decrease in cash of $4,000 and an increase in bonds payable of $16,000 (bonds payable is a long term liability).

Transaction 4 illustrates a decrease in an asset and a decrease in liabilities. Cash is decreased by $5,000, and accounts payable is decreased by a like amount.

After the recording of each transaction, the equality of assets and equities is still maintained. The statement can never be out of balance if the transactions have been correctly recorded.

The Revenue Transaction. What happens if the merchandise is sold at a price which is different from the amounts paid for it? The sale of the merchandise is called a *revenue transaction* and is commonly characterized by a decrease in an asset (the asset sold), a decrease in other assets to recognize the expenses of obtaining the sales, an increase in assets to recognize the receipt of assets from the customer, and an increase in retained earnings (decrease if not a profitable transaction). The revenue transaction is not always accompanied by all these events. Thus, if the revenue arises from the performance of a service, there may not be a decrease of an asset arising from the sale of a product.

To illustrate a revenue transaction, continue the above example and assume that $3,000 of the merchandise on hand is sold for $5,000. The only other expense is the cost of using the building. It is estimated that one-fortieth of the cost of the building has expired during the period in which the sales were made.

Assets		*Equities*	
Cash	$ 6,000	Bonds Payable	$16,000
Merchandise	2,000	Capital Received	
Building	19,500	from Stockholders	10,000
		Retained Earnings	1,500
	$27,500		$27,500

This position statement results from a complex transaction which requires explanation. The cash is increased by $5,000, the amount received from the customers. The building is decreased by $500, one-fortieth of its cost; merchandise is decreased by $3,000, and the retained earnings is increased by $1,500. The reason why the two sides of the position statement are still in balance may be found by examining the following table:

Increases in Assets		*Increases in Equities and Decreases in Assets*	
Cash	$5,000	Merchandise	$3,000
		Building	500
		Retained Earnings	1,500
	$5,000		$5,000

If the results of the operations of the period had not been profitable, the procedure would have been exactly the same except that the retained earnings would have been *negative,* thus causing the title to change to *deficit.* The difference between the revenues of a transaction and the expenses connected with gaining of those revenues is called *income,* if the amount is positive, or *loss,* if negative. In the above example the income is $1,500.

Distributions of Income. If dividends are paid to stockholders and interest to bondholders, the effect is to decrease the amount of earnings retained for use in the enterprise. Continuing the above example, assume that $300 is paid to the stockholders as dividends and $200 is paid to the bondholders. The effect of these transactions is to decrease cash by $500 and to decrease retained earnings by an equal amount.

Assets		*Equities*	
Cash	$ 5,500	Bonds Payable	$16,000
Merchandise	2,000	Capital Received from Stockholders	10,000
Building	19,500	Retained Earnings	1,000
	$27,000		$27,000

Other Costs. If there are other costs incurred in making the sales (for example, sales salaries), these costs may be temporarily set up as assets until the revenue transaction is recognized, and then their expiration may be recorded. The justification for recognizing various costs as assets is easier to explain and justify where a product is being made. For instance, if a worker is cutting firewood, the cost of the firewood set up as an asset should include the labor cost of the worker engaged in the cutting of it.

If $1,000 of wage costs were incurred in making $5,000 of sales in the preceding example, the $1,000 would be recognized as an asset (selling labor cost), and when the revenue transaction was recognized, the cost would be decreased to zero. The additional cost would affect the amount of income and the increase in retained earnings. The income would then be $500 instead of $1,500, since the income for the period had been reduced by the $1,000 of selling labor expense. A statement of revenues and expenses (income statement) would show the following:

THE SAMPLE COMPANY

INCOME STATEMENT

Sales Revenues		$5,000
Less Expenses:		
Cost of Merchandise Sold	$3,000	
Expense of Using Building	500	
Selling Labor Expense	1,000	4,500
Net Income		$ 500

When Do Costs (Assets) Become Expenses? The problem of when to recognize a cost factor as an expense is one of the most perplexing problems the accountant faces. It is easier to describe what should *not* be done than to describe what should be done. For example, whether or not the cost has been paid for with a disbursement of cash has nothing to do with the determination of whether or not it should be recognized as an expense. Thus the electricity consumed in lighting a store is an expense of the revenues earned, even though the electric bill has not yet been paid. If the electricity is used to run a machine, then the cost of the electricity is not considered an expense until the product being made is sold.

Labor costs in a manufacturing situation are considered to be an asset (or cost factor) until the product being made is sold. They become part of the work in process inventory and then the finished goods inventory, but they do not become an expense until the product is sold. For the sake of simplicity it is not unusual for labor costs of a merchandising firm to be considered as expenses of the revenues earned, and the technically correct step of first recognizing them as assets is bypassed. This is not harmful because the labor costs of a merchandising firm would only rarely be considered unexpired at the end of the period.

The guiding rule is that costs should be matched with the revenues which they help earn, and that the cost factors become expenses when the revenues have been earned.

QUESTIONS AND PROBLEMS

3–1. The Armstrong Corporation

Record the following transactions directly to the position statement. After each transaction prepare a new position statement. The answer to this problem will consist of four position statements.

1959	
Jan. 5	Stockholders invest $12,000 in the Armstrong Corporation.
Jan. 7	The company buys $7,000 of merchandise on account.
Jan. 8	The company buys $1,000 of supplies and pays cash.
Jan. 15	The company pays $2,000 to the creditors.

3–2. The Arnold Corporation

The financial position of the Arnold Corporation as of January 15, 1958 was as follows:

Assets		*Equities*	
Cash	$ 6,000	Accounts Payable	$ 4,000
Merchandise	5,000	Capital Received from Stockholders	5,000
Supplies	1,000		
Prepaid Rent	3,000	Retained Earnings	6,000
	$15,000		$15,000

For the day of January 16 the following information was accumulated:

Sales (all for cash)	$8,000
Cost of Merchandise Sold	4,000
Rent Applicable to January 16	100
Supplies Used	400

Prepare a position statement as of January 16, after taking note of the foregoing information.

3–3. The Asta Corporation

Record the following transactions directly to the position statement of the Asta Corporation. The answer to this problem will consist of five position statements.

1957		
Jan. 15	Stockholders invest $100,000 in the Asta Corporation.	
Jan. 20	The following purchases are made (and cash paid):	
	Merchandise	$10,000
	Building	40,000
	Equipment	15,000
Jan. 24	Additional merchandise is purchased on account, $20,000.	
Jan. 26	The company issues $40,000 of bonds and receives that amount of cash from the investors.	
Jan. 31	The following summary of January's sales and costs is prepared:	
	Sales (all for cash)	$12,000
	Cost of Merchandise Sold	7,000
	Wages (all paid for in cash)	2,000
	Cost of Using Building (decrease building) *	600
	Cost of Using Equipment (decrease equipment) *	400

* Costs of this nature are frequently referred to as "depreciation."

3–4. The Atkins Corporation

The financial position of the Atkins Corporation as of January 31, 1958, was as follows:

Assets		*Equities*	
Cash	$12,000	Accounts Payable	$18,000
Accounts Receivable	20,000	Capital Received from Stockholders	13,000
Merchandise	18,000	Retained Earnings	20,000
Prepaid Rent	1,000		
	$51,000		$51,000

For the first week in February the following information was accumulated:

Sales for Cash	$2,000
Sales on Account	3,000
Cost of Merchandise Sold	2,600
Wages Paid (and earned)	1,300
Expiration of Rent	100
Collections of Accounts Receivable	4,000

Required: Prepare a position statement as of the end of the first week in February (February 7), after taking note of the foregoing information.

4

Recording Transactions: Debits and Credits

In the previous chapters the transactions were recorded directly to the position statement. Obviously this would become extremely cumbersome in practice because of the heavy volume of transactions. In addition, information relative to specific items and transactions could be lost as successive transactions were recorded. By inspecting the entire series of position statements, the various transactions could be reconstructed, but this type of analysis would be exceedingly time-consuming.

To provide a history of each item and to dispose efficiently of the large amount of clerical effort required when the entries are recorded directly to the position statement, the accountant records transactions in *accounts.*

Nature of an Account. A separate account is provided for each item in the position statement. In order to be able to record transactions, we must be able to record additions and subtractions. This is solved by drawing a vertical line and deciding that additions will be recorded on one side and subtractions on the other. The one requirement of the system is that *if assets* are increased by entries on the *left-hand* side of the account, *equities* must be increased by entries to the *right* side of the equity account. Thus the reader has the very simple task of memorizing one convention. *Assets* are *increased* by entries to the *left-hand* side of the account. This is the convention employed by accountants in the United States.

If assets are increased by entries to the left-hand side of the account, then all other rules follow automatically:

Assets are decreased by entries to the right side.
Equities are increased by entries to the right side.
Equities are decreased by entries to the left side.

Any Asset Account

Increases	Decreases

Any Equity Account

Decreases	Increases

All the reader has to memorize is the following account. Increases for equities are the opposite of increases for assets. Thus equity accounts are increased by entries to the right-hand side.

Any Asset Account

Increase	

The account form illustrated above is commonly called a "T" account. The formal account may differ in detail, but its use is the same. To illustrate the use of accounts, the same transactions which were recorded directly to the position statement in the preceding chapter will be recorded here in accounts.

Transactions

1. Stockholders invest $10,000.
2. The company buys $5,000 of merchandise on account.
3. The company buys a building for $20,000, pays $4,000 cash, and issues $16,000 of bonds.
4. The merchandise (see Transaction 2) is paid for.
5. Revenue of $5,000 is received for merchandise which cost $3,000. One-fortieth of the cost of the building has expired.
6. Dividends of $300 are paid.
7. Interest of $200 is paid.

The identifying number of the transaction appears in the "T" account near the dollar amount. This facilitates cross-reference. The procedure is called *keying* the transaction.

Cash

(1)	$10,000	(3)	$4,000
(5)	5,000	(4)	5,000
		(6)	300
		(7)	200

Merchandise

(2)	$5,000	(5)	$3,000

Building

(3)	$20,000	(5)	$500

Capital Received from Stockholders

		(1)	$10,000

Accounts Payable

(4)	$5,000	(2)	$5,000

Bonds Payable

		(3)	$16,000

Retained Earnings

(6)	$300	(5)	$1,500
(7)	200		

Equality of Entries. For each *transaction* the amounts recorded on the left side of the accounts are equal to the amounts recorded on the right side of other accounts. This equality must always exist. For each transaction the left- and right-hand amounts must always be equal. This is true because we record both sides of the transaction.

The assets and equities started out equal. The fact that each entry is balanced (the left-hand and right-hand amounts are equal) ensures that the equality is not altered by additional entries.

Debits and Credits. By now the reader will probably have noted the awkwardness of speaking of entries "to the left side of an account" and entries "to the right side of the account." This difficulty is eliminated by the use of specialized terminology. Thus, instead of entries to the left side of an account, the accountant speaks of *debits* (abbreviated Dr.). Instead of entries to the right side of an account, the accountant speaks of *credits* (abbreviated Cr.). These are the primary definitions of debits and credits. The reader is likely to run into confusion if he attempts to use such words as debtor or creditor as an assistance to understand what the accountant means by debit and credit. The only definition that must be known is that *a debit is an entry to the left-hand side of an account.* It follows that a credit is an entry to the right-hand side of an account.

It has previously been shown that an entry to the left-hand side of an asset account increases that account (thus a debit increases an asset account) and that a credit will have the opposite effect. In like manner a credit will increase an equity account and a debit will decrease it.

Any Asset Account

Debit (increase)	Credit (decrease)

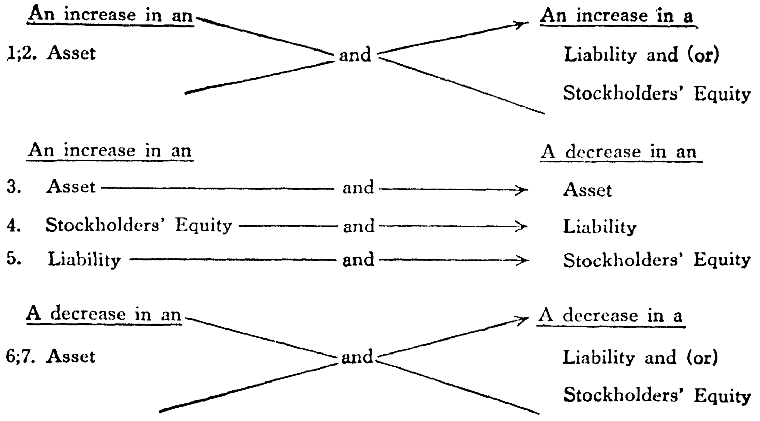
Any Equity Account

Debit (decrease)	Credit (increase)

The term *charge* is often used interchangeably with debit. Thus a charge to a customer's account is a debit.

Accounting Transactions. In any accounting entry the debits must equal the credits. This is synonomous with the statement that entries to the left-hand side of accounts must equal entries to the right-hand side. Entries may take many forms, for there are a variety of transactions which will cause debits and credits.

Seven basic possibilities are listed in the following illustration. It is not possible to make an entry that increases one asset and to make another entry that also increases an asset (two debits and no credits). Nor is it possible to make an entry that increases liabilities and stockholders' equity but does not decrease another account (two credits and no debits). There *must be* a debit as well as a credit for making up a complete financial transaction.


An increase in an
1;2. Asset
and
An increase in a
Liability and (or)
Stockholders' Equity
An increase in an
3. Asset
4. Stockholders' Equity
5. Liability
and
and
and
A decrease in an
Asset
Liability
Stockholders' Equity
A decrease in an
6;7. Asset
and
A decrease in a
Liability and (or)
Stockholders' Equity

Illustrations of the seven basic possibilities of entries are:

1. Increase in an asset and increase in a liability.
   Borrowing $500 on a note from the bank (Dr. Cash and Cr. Notes Payable).
2. Increase in an asset and an increase in stockholders' equity.
   Investment of $400 by stockholders (Dr. Cash and Cr. Capital Received from Stockholders).
3. Increase in an asset and decrease in an asset.
   Buy a piece of equipment for $300 (Dr. Equipment and Cr. Cash).
4. Increase in the stockholders' equity and decrease in a liability.
   Bonds are converted into capital stock (Dr. Bonds Payable and Cr. Capital Stock).
5. Increase in a liability and decrease in the stockholders' equity.
   Dividends are declared (Dr. Retained Earnings and Cr. Dividends Payable).
6. Decrease in an asset and decrease in a liability.
   Dividends are paid (Dr. Dividends Payable and Cr. Cash).
7. Decrease in an asset and decrease in the stockholders' equity.
   Capital stock is retired by the company (Dr. Capital Received from Stockholders and Cr. Cash).

The procedure for deciding on the entries to be made in recording a financial transaction actually consists of three steps:

1. Deciding what accounts are affected.
2. Deciding whether to debit or credit the accounts.
3. Deciding on the amounts to be debited or credited.

Assume that $500 of accounts payable are paid. What accounts are affected? "Cash" and "Accounts Payable" are the two accounts affected. Cash is decreased and accounts payable is decreased. To decrease an asset, it is necessary to credit it, and to decrease a liability, it is necessary to debit it. Thus the transaction is recorded by debiting accounts payable and crediting cash for $500. This type of systematic analysis is invaluable in recording transactions.

There may be combinations of the various types of entries illustrated. Assume that a building is purchased for $30,000 and that $10,000 cash is paid, while the remainder of the purchase price is satisfied by the issuance of common stock to the seller of the building. There are three accounts affected: "Building" is increased by $30,000 (debited), "Cash" is decreased by $10,000 (credited), and "Capital Received from Stockholders" is increased by $20,000 (credited).

Account Balances. For many purposes it is necessary to determine the balance in an account. This is accomplished by adding the debits, adding the credits, and determining the difference between the two. In the problem illustrated earlier in this chapter the cash account was as follows:

Cash

(1)	$10,000	(3)	$4,000
(5)	5,000	(4)	5,000
		(6)	300
		(7)	200

The debits total $15,000, and the credits total $9,500. The difference is a debit *balance* of $5,500. This may be solved by using a formal process called *ruling and balancing.* The accountant determines the amount necessary to balance the two accounts, inserts it in the proper column so that the two columns have equal totals, checks the balancing figure by actually totaling the numbers on the debit and credit sides, and then carries forward the balance so that each account shows the opening balance. The account will then appear as follows:

Cash

(1)	$10,000	(3)	$4,000
(5)	5,000	(4)	5,000
		(6)	300
		(7)	200
		Balance √	5,500
	$15,000		$15,000
Balance √	$5,500		

QUESTIONS AND PROBLEMS

4–1. (a) Certain accounts are increased by entries to the left side of the account, others by entries to the right side of the account. For each of the following items indicate whether the amount should be entered on the right or left side of the account.

Increase Cash
Increase Wages Payable
Decrease Bonds Payable
Increase Retained Earnings
Decrease Cash in Bank
Increase in Capital Received from Stockholders

(b) For each of the above items give an illustrative transaction and identify the resulting accounting entry.

4–2. (a) For each of the following transactions indicate the two (or more) accounts which are affected and how they are affected (increase or decrease):

1. Cash is invested by the stockholders.
2. Merchandise is purchased on account.
3. The merchandise is paid for.
4. Insurance is purchased and paid for.
5. Merchandise is sold on account.
6. Dividends are paid to the stockholders.

(b) Indicate whether the accounts are debited or credited.

4–3. Set up "T" accounts and record the following transactions of the Babbitt Corporation:

1. Stockholders invest $100,000.
2. The company buys $9,000 of merchandise on account.
3. The company pays $4,000 of the amount owed for the merchandise.
4. One year's rent is paid, $1,200. The rent applies to the year beginning March 1.
5. Revenue for March, the first month of operations, is $9,900. All sales were for cash. The merchandise sold cost $5,800. Salaries paid to employees during the month were $1,000, and the firm owes $200 of wages as of the end of the month.
6. Dividends of $500 were paid to stockholders.

4–4 (continuing problem 4–3). Prepare a statement of financial position as of March 31, 1958.

4–5. Taking the same situations described in problem 4–1, indicate whether the accounts should be debited or credited.

4–6. Give a one-sentence definition of a "debit."

4–7. The statement is often made that such and such is a debit to the community. Explain why this type of statement is meaningless from an accounting point of view.

4–8. Explain briefly how debits and credits affect the various types of position statement accounts.

4–9. Rule and balance the following accounts:

Cash in Bank

Balance √	$20,000	$15,000
	25,000	12,000
	5,000	

Accounts Payable

$15,000	Balance √	$24,000
		13,000

4–10. (a) Set up "T" accounts and record the following transactions; key all transactions:

1. Stockholders invest $100,000.
2. The company buys $12,000 of merchandise on account.
3. The company buys a building, paying $2,000 cash and assuming a $28,000 mortgage for the remainder of the purchase price of $30,000.
4. The merchandise (see Transaction 2) is paid for.
5. Sales of $9,000 are made. Of these sales $7,000 are for cash and the remainder on account. The cost of the merchandise sold is $6,000. One-thirtieth of the life of the building has expired during the period in which the sales were made. Wages earned and paid during this period were $1,200.
6. An amount of $800 is paid to the mortgagor. Of this amount $560 is interest and the remainder is amortization of the principal.
7. Dividends of $400 are paid to the stockholders.

(b) Prepare a position statement as of December 31, 1957 (taking note of all the given transactions).

4–11. For each of the following transactions indicate what accounts are likely to be affected and whether the accounts are likely to be debited or credited.

1. Money is received from stockholders.
2. Merchandise is purchased on account.
3. A building is purchased. Payment is made by cash and by taking out a mortgage.
4. A piece of equipment is sold for cash.
5. Dividends to stockholders are declared.
6. Dividends are paid to stockholders.
7. Bonds are issued and the cash received.
8. Bonds are converted into common stock.
9. Merchandise is sold for cash.
10. Interest is earned by the bondholders (owed by the company).

4–12. It is sometimes said that accounting is double-entry bookkeeping and is a waste of time because everything is recorded twice. Attempt to describe a financial transaction that affects only one account, or one in which the debits do not equal the credits.

5

Recording Transactions: Expense and Revenue Accounts

IN THE PREVIOUS chapters the revenues and expenses were recorded in one complex transaction and only asset and equity accounts were used. In this chapter temporary accounts are introduced in which the revenues and expenses are recorded and accumulated separately. Revenue and expense accounts come into being not because of theoretical reasons but rather because of practical considerations. Imagine the difficulty of computing the expenses connected with the sale of one automobile, one can of soup, one gallon of gasoline, etc., just to be able to record the sale of each of those items. The difficulty is avoided by using temporary accounts to record the revenues and expenses, and by not computing the income of each sale. Management is interested in the results of the operations, but it does not need to know the profit of each individual sale. Sales may be grouped together and the results of the operations of a time period (month, quarter, year, etc.) determined. In special situations where the sales consist of items with a large dollar value per unit, the profit of the individual sale may well be determined.

Expense accounts are also useful in analyzing efficiency and controlling costs. They perform the function of itemizing the expenditure of resources in gaining the revenues. It should be remembered that an expense is recognized because an asset has expired. This may or may not be accompanied by an expenditure of cash. The sales effort connected with making a sale becomes an expense even though the salesman has not yet been paid. The same is true with electricity, rent, supplies, etc.

Illustration of Revenue Transaction, Using Only Asset and Equity Accounts. Assume that the opening balances of the below "T" accounts reflect the financial position of the Sample Company (the balances are indicated by checks √). The transaction numbered 1 records the sale of $60 of merchandise for $100. The only other expense is the expiration of $15 of prepaid rent.

Cash

√ $300	
(1) 100	

Capital Received from Stockholders

	√ $200

Merchandise

√ $150	(1) $60

Retained Earnings

	√ $295
	(1) 25

Prepaid Rent

√ $45	(1) $15

In order to record the sale it was necessary to compute all the expenses connected with the sale and the income connected with that individual sale. This procedure is too expensive and unwieldy and therefore the following system is employed in practice.

Illustration of Revenue Transaction, Using Temporary Accounts. Henceforward revenues and expenses will be recorded by using temporary accounts. Use the preceding illustration and add the following accounts:

Sales
Merchandise Cost of Goods Sold
Rent Expense

Instead of one entry, four entries will be required.

1. To record the receipt of the cash and the sale. An asset account (Cash) is debited and a revenue account (Sales) is credited for the amount of the sale.
2. To record the Merchandise Cost of goods sold.
3. To record the Rent Expense.
4. To close all temporary accounts, to compare expenses and revenues, and to record the income (increase in retained earnings).

Cash

√ $300	
(1) 100	

Merchandise Cost of Goods Sold

(2) $60	(4) $60

Merchandise

√ $150	(2) $60

Rent Expense

(3) $15	(4) $15

Prepaid Rent

√ $45	(3) $15

Capital Received from Stockholders

	√ $200

Sales

(4) $100	(1) $100

Retained Earnings

	√ $295
	(4) 25

The costs are first accumulated in asset accounts (Merchandise and Prepaid Rent) and are recognized as expenses (Merchandise Cost of Goods Sold and Rent Expense) only after the goods are sold or as the value of the asset decreases with the passage of time (for example, Prepaid Rent).

Only entry 1 (debit Cash and credit Sales) has to be made at the time of the sale. The other entries can be postponed until the end of the accounting period and then made in summary fashion. By being able to recognize the asset and the revenue increases without recognizing the expenses associated with each specific sale, a large amount of clerical work is eliminated. By multiplying the number of sales transactions by a million, you multiply the number of entries by a million under the procedure which does not use revenue and expense accounts. This is not true if revenue and expense accounts are used, since the entries to record expenses will be made periodically. Also, under the latter procedure the information is classified in a useful manner. It is important that management knows the amount of the various expenses for the period; therefore the use of expense accounts is desirable.

The characteristics of the revenue and expense accounts should be noted. The expense accounts are increased by debits. This is related to the fact that they tend to decrease the stockholders' equity. The revenue accounts are increased by credits. This is related to the fact that revenues tend to increase the stockholders' equity. It is also connected with the fact that the $100 credit to revenue is analogous to the three credits (merchandise credit, $60; prepaid rent credit, $15; and retained earnings credit, $25) made under the first system. The revenue account is a suspense account for these three credits until the expenses for the total revenues can be computed and subtracted, thus deriving the income.

Students frequently will incorrectly debit revenue accounts in an attempt to increase them. This arises from the following incorrect reasoning: "Assets are increased by debits (correct); revenues are assets and therefore they should be increased by debits (incorrect)." The assets that are received and which help measure the revenues are *debited;* the revenue account is *credited.* The revenue account, in a very strict accounting sense, is not an asset account, but rather it is a suspense account of decreases in assets and increases in stockholders' equities. The revenues are measured by assets but in themselves are not assets but *sources* of assets. Just as accounts payable is credited to record an asset source, revenue is credited to record the source of assets arising from sale of products or services.

Books of Record: Journal Entries. To this point all entries have been made in "T" accounts. The "T" account is a very useful device for recording accounting entries, and is very closely related to the general ledger. The general ledger is the backbone of any accounting system because it is the group of accounts. It may take the form of a bound book (each page being an account), a loose-leaf notebook, or a collection of cards (each card being an account). The accounts which make up the ledger are very much similar to the "T" accounts. The prime difference is that there are additional columns for information, such as the date, explanations, and the reference for the entry. The usual reference is the journal page number.

The journal may take many forms (a book, page, folder, or machine card), but by definition the journal is the book of original entry. The entry is first recorded in the journal and then transferred to the ledger. The most common form of journal entry is as follows:

Date		Account	LF	Debit		Credit	
19—							
Dec.	10	Cash		$100,000	00		
		Capital Received from Stockholders				$100,000	00
		To record the investment of $100,000 by the stockholders					

The debits are listed first. The credits are listed secondly and are indented to the right. An explanation is not necessary although it is usually desirable, especially with unusual entries. The LF column is used to note the general ledger accounts (sometimes referred to as ledger folios; thus LF), in which the amounts are finally recorded. *After* the amounts are recorded in the ledger, the ledger account number is recorded in the LF column of the journal.

Recording Sales and Cost of Goods Sold. Assume that merchandise which cost $75 is sold for $100. The sale would be recorded as follows:

Cash	$100	
Sales		$100
To record the sale		

If the cost of merchandise sold is known, as in the preceding example, the following entry can be made:

Merchandise Cost of Goods Sold	$75	
Merchandise		$75
To record the cost of goods sold		

The foregoing procedure is illustrative of a *perpetual* inventory procedure.

In many cases the cost of the merchandise sold is *not* known. In situations of this nature only the first entry would be made. The second entry of recording the cost of goods sold would *not* be made at the time of the sale. At the end of the accounting period an inventory would be taken, and the cost of goods sold would be computed, using the following formula:

Cost of goods sold = goods available for sale — ending inventory

or:

Cost of goods sold = opening inventory + purchases — ending inventory

The entry to record cost of goods sold would then be made "periodically," based on the results of the ending inventory and the given formulas. Thus, in practice, there may be a considerable time lag between the recording of the revenue entry and the recognition of the expenses connected with the gaining of those revenues. But all expenses will be recognized by the end of the time period for which the income is being determined. Since income is generally measured at least once a year, expenses will be recognized and recorded at least yearly.

The Matching Concept—Timing of Expense Recognition. When should a cost factor (an asset) be recognized as an expense and be charged against the revenues of the period? An attempt is made to match the expenses with the revenues with which they are associated. Thus the cost of a building is charged to expense over its useful life. The revenues of each period of use bear some of the expense because of the facts that an asset is being used and the value of that asset (the building) is expiring.

It is important to note that the charging of a cost factor to expense is *not* connected to the actual disbursement of cash. The expense may appear in the accounting period even though the cash disbursement may have occurred in a period long since past (as in the case of a building), or in a future period (as is frequently true with merchandise or labor). The objective is to charge the revenues with the expenses associated with the earning of those revenues.

It frequently happens that an asset factor expires without having produced any revenue. An example of this type of transaction is the burning of a building or the theft of cash. Situations of this nature are described as "losses." A loss occurs when an asset is either partially or wholly depleted without equitable replacement by other assets.

QUESTIONS AND PROBLEMS

5–1. The Burns Company

The management of the Burns Company does not use expense and revenue accounts. The company follows the policy of computing the expenses associated with each individual sale. The following expenses are incurred and recognized for each sale:

Cost of merchandise sold.
Labor. (It is assumed that labor cost is equal to $0.10 per dollar of sales.)
Rent. (It is assumed that the rent expense is equal to $0.05 per dollar of sales.)
Insurance. (It is assumed that the insurance expense is equal to $0.01 per dollar of sales.)
Supplies. (It is assumed that supplies expense is $0.03 per dollar of sales.)

Assume that one sale is for $100. The merchandise that was sold cost $60.

Required: Make the entries for the sale, using "T" accounts. The account balances before the transaction were as follows:

	Debits	*Credits*
Cash	$20,000	
Merchandise	10,000	
Labor Costs	2,000	
Prepaid Rent	800	
Prepaid Insurance	500	
Supplies	700	
Capital Received from Stockholders		$20,000
Retained Earnings		14,000
	$34,000	$34,000

5–2. The Burnside Company

(a) Record the following transactions for 1958, using "T" accounts (open any accounts you may need). The Burnside Company uses the periodic inventory procedure and does not relieve inventory at the time of sale.

1. Sales of $150,000 are made of which $90,000 were made on account.
2. Collections during the period from customers were $95,000.
3. Merchandise purchased on account during the period was $80,000.

4. The merchandise inventory on December 31, 1958, was $45,000.
5. Payments to trade creditors for merchandise and supplies purchased were $85,000.
6. Supplies purchased on account during the period were $5,500.
7. On December 15, 1958, the rent for 1959 was paid, $2,400. The rent for the year 1958 was $4,000.
8. As of December 31, 1958, the company owed its employees $5,000 of wages.
9. Supplies on hand as of December 31, 1958, were $900.

The account balances before the transactions were as follows:

	December 31, 1957 *Debit*	 *Credit*
Cash	$ 60,000	
Accounts Receivable	25,500	
Merchandise	60,000	
Supplies	500	
Rent Expense	4,000	
Labor Costs	65,000	
Merchandise Cost of Goods Sold	———	
Supplies Expense	———	
Prepaid Rent	———	
Accounts Payable		$ 40,000
Wages Payable		———
Sales		———
Capital Received from Stockholders		100,000
Retained Earnings		75,000
	$215,000	$215,000

(b) Prepare a position statement for the Burnside Company as of December 31, 1958.

5–3. Explain why revenues are increased by credits and expenses are increased by debits.

5–4. Record the following transactions, using journal entries. When is the merchandise recognized as an expense?

1. Merchandise costing $19,000 is purchased on account.
2. Merchandise that cost $2,100 is sold for $4,500 cash.
3. Of the amount owed to trade creditors, $12,000 is paid.

5–5. The Burt Company

The accountant of the Burt Company makes use of expense and revenue accounts. He uses a periodic inventory procedure (does not record cost of goods sold at time of sale). All sales are for cash.

1. Stockholders invest $100,000 on January 1, 1959.
2. Rent of $4,800 is paid. This is rent for a 12-month period beginning February 1.

3. Merchandise which cost $25,000 is purchased on account.
4. Fixtures with an estimated life of five years are purchased for $6,000 cash.
5. The Burt Company starts operations on February 1. Sales for the first week are $5,000.
6. Wages for the first week are $400. They are not paid at this time.
7. Accounts Payable (see 3) is paid.
8. Sales for the second week are $6,000.
9. Merchandise which cost $20,000 is purchased on account.
10. Wages for the second week are $500. They are not paid at this time.
11. The wages for the first two weeks are paid.
12. Sales for the third week are $10,000.
13. Wages for the third week are $600. They are not paid at this time.
14. Sales for the fourth week are $11,000.
15. Wages for the fourth week are $650. They are not paid at this time.
16. Bill for electricity for February is $100. Not paid in February.
17. Bill for telephone for February is $60. Not paid in February.
18. A physical inventory of merchandise discloses that there is $21,300 of merchandise on hand as of February 28.

Required

(a) Record the transactions 1–18 in "T" accounts, including the recognition of expenses arising from decreases in assets, not explicitly described in the transactions (for example, the decrease in prepaid rent).
(b) Close out all revenue and expense accounts.
(c) Prepare a position statement as of February 28.
(d) Prepare a statement of revenues and expenses.

5–6. When a purchase is made, would you expect the item purchased to be recorded in an asset account or an expense account? Explain.

5–7. At what step should the cost of the oil be considered an expense?

(a) Oil is ordered.
(b) The oil is received.
(c) The oil is paid for by check.
(d) The oil is burned in a boiler to make steam which is used to run a generator which produces electricity which powers a machine which manufactures gadgets.
(e) A gadget is shipped to a wholesaler and the wholesaler is billed.

6

Adjusting and Closing Entries

THE FIRST FIVE chapters contained adjusting and closing entries, although they were not specifically defined as such. This chapter will attempt to make clear the nature of adusting and closing entries and an acceptable convention for recording these entries. Many situations that require adusting entries will be introduced later in the text as the reader is exposed to additional accounting problems.

Need for Adjusting Entries. At the end of an accounting period it is necessary to appraise the asset and equity accounts and to determine whether any additional entries have to be made to them. These entries, which have to be made to bring the asset and equity accounts into agreement with the facts of the situation as of the date of the prospective accounting reports, are called *adjusting entries.* Adjusting entries may take various forms. The following are merely a few illustrations:

1. Asset and revenues not previously recognized:

Interest Receivable	$100	
Interest Revenue		$100
To record interest on investments which has not been previously recognized		

2. Asset and liability not previously recognized:

Material (Inventory)	$300	
Accounts Payable		$300
To record material received on Dec. 31, 19—, but not yet recorded		

3. Liability and expense not yet recorded:

Travel Expense	$100	
Accounts Payable		$100
To record an expense incurred, but not recorded or paid		

4. Expense and decrease in an asset not yet recorded:

Rent Expense	$200	
Prepaid Rent		$200
To record or "accrue" the rent expense for the period		

5. To record the declaration of a dividend to stockholders:

Dividends	$500	
Dividends Payable		$500
To record a dividend to stockholders, declared but not previously recorded		

6. To record the liability to bondholders not yet recorded:

Interest Charges	$100	
Interest Payable		$100
To record the interest charge and the interest liability not previously recorded		

Wages, taxes, and other items are often spoken of as being "accrued." This means that they have come into being over a period of time and should be recognized in the accounts. *To accrue* taxes means that tax expense should be debited and taxes payable should be credited. Instead of taxes payable the account used to record the liability is sometimes called "Taxes Accrued," and even worse, "Reserve for Taxes." Titles of this nature merely add to the confusion associated with accounting.

There is nothing mysterious about adjusting entries. They merely bring the accounts up to date, correcting errors and omissions.

Closing Entries. Since temporary accounts are being used to record revenues and expenses during the period, they must be disposed of at the end of the accounting period. The procedure of eliminating revenue and expense accounts is known as *closing,* and the entries are called *closing entries.*

There are various techniques for closing expense and revenue accounts. The procedure illustrated here makes use of two summary accounts, an "Expense and Revenue Summary" and an "Income Summary." It is also possible to "close," using one summary account or none at all. In fact it is possible to prepare accounting reports without formally preparing closing entries. The entries are implicit in the system, but they are not actually made. Only the position statement accounts are carried forward to the next period.

Expense and Revenue Summary. The Expense and Revenue Summary account is used to compare all revenues and expenses of the period. Thus all revenue and related accounts are closed into this summary account; also, all expense, tax, and loss accounts. The revenue items will appear on the credit side of the account (tending to increase the stockholders' equity). The expense, taxes, and losses will appear on the debit side (tending to decrease the stockholders' equity). If the credits (revenues) are greater than the debits (expenses, losses, and taxes), then the firm has been profitable and there is a net income. This income is transferred to the "Income Summary" by debiting the "Expense and Revenue Summary" and crediting the "Income Summary." If the debits (expenses, losses, and taxes) are greater than the revenues, then the firm has a net loss rather than an income. The closing entry is a credit to the expense and revenue summary (to equate the debits and credits) and a debit to the income summary (tending to decrease the stockholders' equity).

At the conclusion of these entries all revenue and expense accounts, including the expense and revenue summary, will have zero balances.

Income Summary. The income summary compares the income of the period with the distribution of the income to the owners, determines the addition to the earnings retained for use in the business, and transfers that amount to the retained earnings account.

The expense and revenue summary is closed into the income summary. If the operations have been profitable, the transfer will be found on the credit side of the income summary (tending to increase the stockholders' equity). If the firm has not been profitable, the transfer will be found on the debit side of the account (tending to decrease the stockholders' equity).

The dividend distribution and interest charge accounts are also closed into the income summary. Both items will be considered as distributions of income, although there is some dispute about interest charges. These transfers will be found on the debit side of the income summary, since the distributions decreased the stockholders' equity.

The balance in the income summary is transferred to the retained earnings account. If the balance is a credit, the transfer will increase the retained earnings, since the income was greater than the distributions of income. If the balance is a debit, then the transfer will decrease retained earnings, since the income was less than the distributions of income.

Although *interest charges* are considered as distributions of the income of the corporation, the return on investments, *interest revenue,* is properly considered to be of the same general nature as the other revenue and is closed to the expense and revenue summary.

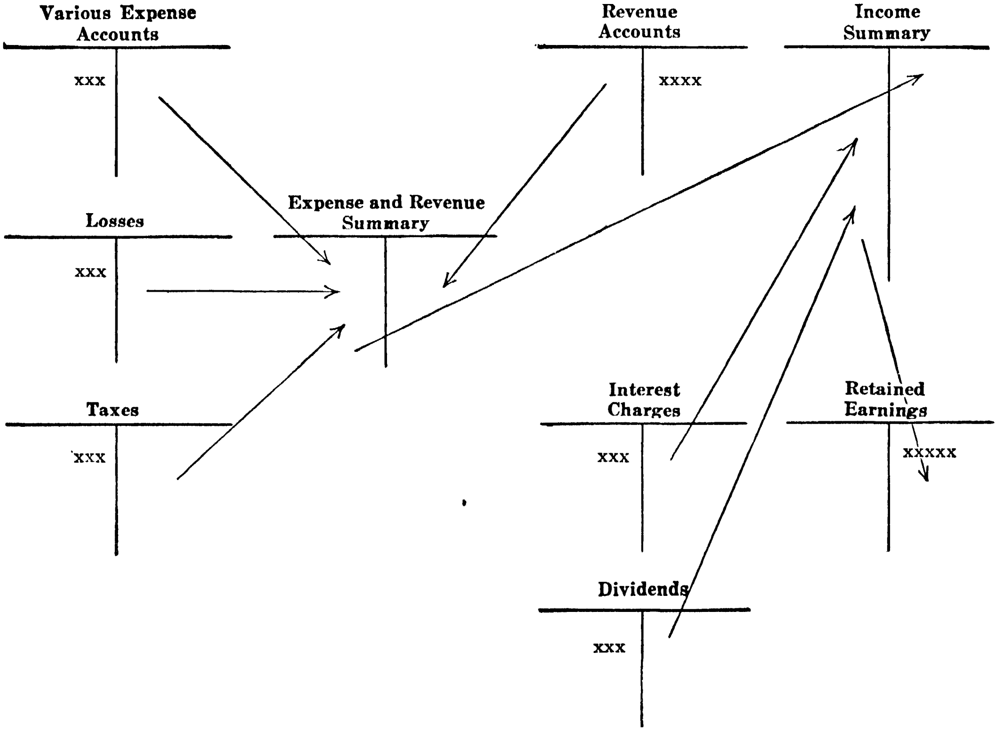
After all closing entries have been made, the only accounts with balances will be asset and equity accounts. All temporary or summary accounts will have been closed and will have zero balances.

It should be realized that there is nothing sacrosanct about the use of summary accounts in general, and the use of the income summary specifically.

It is merely a technique and not an integral part of accounting theory. For example, the interest charge and dividend accounts could be closed directly to "Retained Earnings," since they are distributions of earnings.

Even more controversial is the question whether interest is an income distribution or an expense. Conventional treatment considers interest to be an expense. In a sense it is an expense because it decreases the earnings of the stockholders. But from the point of view of the entity, following a strict interpretation of the entity theory (that accounting practice records entries for the corporation and not for the owners), interest charges are a distribution of income of the corporate entity. Does this difference in treatment create any material disparity? In most cases classification of interest as an expense or as an income distribution does not matter greatly. The suggestion made in this text, that interest be treated as income distribution, is based on the premise that situations exist in which the treatment does make a difference (for example, a study of the utilization of resources). These are marginal cases, however, and do not negate the usefulness of treating interest as an expense for general reporting purposes.

Flow of Closing Entries. The accompanying diagram illustrates the flow of closing entries for a profitable operation where the distributions of income were less than the income of the period. The *xxx*'s indicate that the account had a balance before the closing entries were made. Retained earnings


Various Expense Accounts
xxx
Revenue Accounts
xxxx
Income Summary
Losses
xxx
Expense and Revenue Summary
Taxes
xxx
Interest Charges
xxx
Retained Earnings
xxxxx
Dividends
xxx

is the only account shown which will not have a zero balance after the closing entries are made.

Illustrative Example: Flow of Closing Entries

Merchandise Cost of Goods Sold

$1,000	(2) $1,000

Expense and Revenue Summary

(2) $1,000	(1) $2,000
(3) 500	
(4) 250	
(6) 250	

Rent and Other Expenses

$500	(3) $500

Income Summary

(5) $100	(6) $250
(7) 150	

Taxes

$250	(4) $250

Retained Earnings

	√ $50,000
	(7) 150

Dividends

$100	(5) $100

Sales Revenues

(1) $2,000	$2,000

Explanation of Entries

1. To close the sales revenue account to the expense and revenue summary.
2, 3, and 4. To close the expense and tax accounts to the expense revenue summary.
5. To close the dividend distribution account to the income summary.
6. To transfer *the income for the period,* $250, to the income summary.
7. To transfer the increase in retained earnings, $150, to the retained earnings account.

The only one of the foregoing accounts with a balance after the closing entries is the retained earnings account. Note that the way to close an account with a debit balance is to credit it. This sometimes confuses beginning students who fail to realize that the debit balance is merely being transferred.

Simplified Closing Procedures. The two closing summary accounts (expense and revenue, and income) are useful as a learning and teaching device, but the reader should remember that there are many different procedures for preparing closing entries. Other procedures are not incorrect but are merely different. One possible procedure in the closing process is to bypass the use of summary accounts entirely. Instead of using an expense and revenue or income account to close the accounts in the preceding example, the following journal entry could be prepared:

Sales Revenue	$2,000	
Merchandise Cost of Goods Sold		$1,000
Rent and Other Expenses		500
Taxes		250
Dividends		100
Retained Earnings		150
To close all revenue, expense, and income distribution accounts, and to record the increase in retained earnings		

The foregoing journal entry contains all the information previously presented in the summary accounts, and this closing procedure is certainly acceptable.

Another possible procedure frequently found in practice is to carry forward the balances of all asset and equity accounts from the preceding period. The journal entry shown here would not be explicitly made, but all revenue and revenue deduction accounts would start the new accounting period with zero balances; thus, in effect, the closing entries would be made. This procedure is especially applicable to machine accounting systems but is not limited to them.

QUESTIONS AND PROBLEMS

6–1. The Cable Company

THE CABLE COMPANY
TRIAL BALANCE
AS OF DECEMBER 31, 1957

Account	*Debits*	*Credits*
Cash in Bank	$ 27,000	
Merchandise	40,000	
Supplies	500	
Prepaid Rent	2,400	
Accounts Payable		$ 7,400
Wages Payable		—
Taxes Payable		—
Bonds Payable		20,000
Capital Received from Stockholders		10,000
Retained Earnings		2,000
Revenue from Sales		70,000
Labor Expense	33,000	
Supplies Expense	6,500	
	$109,400	$109,400

Additional Information

1. An inventory of merchandise on December 31, 1957, disclosed that there was $15,000 of merchandise on hand.
2. Supplies on hand, $2,500. The bookkeeper has debited supplies expense when supplies were received.
3. The monthly rent is $100. The rent for 1958 was paid on December 15. The payment has been recorded.
4. Supplies costing $1,000 were received on December 30. They were included in the physical inventory, but the bookkeeper has not recorded the acquisition as yet.
5. As of December 31 the firm owed its employees $200.
6. The bonds have a coupon rate of 5%. The interest for the period July 1–December 31 is payable as of January 1. The bonds were issued July 1, 1957.
7. Dividends of $1,000 were declared (not paid) on December 30, 1957.
8. Income tax expense for the year 1957 is computed to be $2,500.

Required

(a) Set up "T" accounts for all accounts given and any accounts required.
(b) Record all adjusting entries. Number (key) these entries.
(c) Record all closing entries. Key these entries with letters.
(d) Prepare a position statement for the Cable Company as of December 31, 1957.

6–2. The Cabot Corporation

TRIAL BALANCE
AS OF DECEMBER 31, 1957

Accounts	*Debits*	*Credits*
Cash in Bank	$ 40,000	
Merchandise	70,000	
Supplies	1,000	
Prepaid Rent	2,400	
Accounts Payable		$ 8,000
Wages Payable		———
Interest Payable		———
Taxes Payable		———
Bonds Payable		20,000
Capital Received from Stockholders		30,000
Retained Earnings	9,500	
Sales Revenues		90,000
Supplies Expense	4,600	
Labor Expense	20,000	
Interest Charges	500	
	$148,000	$148,000

Additional Information

1. An analysis of wages and salaries indicates that $200 is owed to em-

ployees as of December 31, 1957, for work performed from December 27 to December 31.

2. During the year, purchased supplies were debited to supplies expense as they were purchased. An inventory of supplies indicates that there are $1,300 of supplies on hand on December 31.
3. The rent is $200 per month. No entry has been made to record rent expense during the period.
4. Interest on the bonds is payable on July 1 and January 1. The interest rate is 5%.
5. An inventory of merchandise on December 31, 1957, indicated that there was $12,000 of merchandise on hand.
6. An analysis of purchases indicated that $4,000 of merchandise received on December 31 had not been recorded by the accounting department. This merchandise was included in the inventory taken on December 31, 1957.
7. Income taxes for the year are $500. No payments have been made.

Required

(a) Set up "T" accounts for all accounts given or required.
(b) Record all adjustments. Key these entries with numbers.
(c) Record all closing entries. Key these entries with letters.
(d) Prepare a position statement for the Cabot Company as of December 31, 1957.

6–3. For each of the following situations give the adjusting entry required:

1. The supplies account has a balance of $6,000. An inventory indicates there are $500 of supplies on hand.
2. There are $700 of wages not yet recorded. This is for labor incurred the last three days of the month.
3. The prepaid insurance account has a balance of $800. An analysis of the insurance contracts indicates that the amount of insurance prepaid as of the end of the month is $500.
4. Six months' interest on $100,000 of 4% bonds outstanding (a liability) has not yet been recognized.
5. Six months' interest of $80,000 on government securities held as an investment has not yet been recognized.
6. The declaration of a $5,000 dividend on outstanding stock has not yet been recorded.

7

The Income Statement

THE POSITION STATEMENT shows the recorded financial position of an enterprise at *a moment* in time. The income statement shows the results of operations for *a period* of time. While the position statement is "As of" a particular moment, the income statement is "For the Month Ending —." The period of time may be a year or any fraction of a year, but it is a period of time rather than a moment of time.

The income statement compares the revenues of the period with the expenses which were incurred to gain those revenues. The difference between the revenues and expenses, losses, and taxes is the income of the period.

$$\text{Revenues} - (\text{expenses} + \text{losses} + \text{taxes}) = \text{income}$$

Illustration

During the month of January, 19—, the X Company recorded $10,000 of revenues, $3,000 of wage expenses, $1,000 rent, and $200 for utilities. It also had a fire loss of $800 and taxes of $2,000. The income statement would appear as follows:

X COMPANY
INCOME STATEMENT
FOR MONTH ENDING JANUARY 31, 19—

Revenues			$10,000
Less Expenses, Losses, and Taxes:			
Expenses:			
Wages	$3,000		
Rent	1,000		
Utilities	200		
Total Expenses		$4,200	
Fire Loss		800	
Taxes		2,000	
Total Expenses, Losses, and Taxes			7,000
Net Income			$3,000

The expense and revenue summary would appear as follows:

Expense and Revenue Summary

Revenue deductions:	Revenues:
$3,000	$10,000
1,000	
200	
800	
2,000	
Net income:	
(1)3,000	

Retained Earnings

	Increase in retained earnings:
	(1)$3,000

The income statement can actually be made directly from the expense and revenue summary. All revenues and revenue deductions are summarized in that account. If there are also distributions of income, then the income summary will also be used to construct the income statement. The relationship between the income statement and the two summary accounts is important because it brings into focus the use of these accounts.

Characteristics of Income Statement Illustrated. As in many areas of accounting, there is no uniform agreement among accountants on the subject of the form or content of an income statement. The form and theory presented in this text are the *single-step, all-inclusive* income statement. The *single-step* part of the title refers to the fact that there are no income subtotals above the net income figure (this is the net income of the corporation). Some accountants prefer to take various subtotals such as "Gross Profit," "Net Income before Depreciation," and "Net Income before Taxes." The single-step form is simpler and avoids the confusion arising from presenting half a dozen income figures. Which is the significant income figure? The average reader of a financial report is likely to be puzzled by the numerous subtotals rather than be assisted by them.

An all-inclusive income statement has the characteristic that no entries are made directly to the retained earnings account, but rather they must all pass through the expense and revenue summary and the income statement. There are many accountants who feel that certain adjustments should be made directly to the retained earnings account, thus not affecting the income of any year. Thus, if it is found that an asset is worthless and should be written off, the credit is recorded to the asset account, but the debit can be recorded to either a loss account (to be run through the expense and revenue summary) or directly to the retained earnings (bypassing the expense and revenue summary *and* the income statement). The disadvantage of running unusual losses through the income statement is that they distort the measurement of the current year's income. The advantage is that the possibility of manipulation of the accounting is reduced. Since the all-inclusive income statement is used in this text, no entries will be made directly to retained earnings, except the transfer from the income summary or items not of an income nature (for example, capital transactions).

Interest and Dividends. In the illustration there were no interest charges or dividends. If there had been interest charges, they would have been subtracted from the net income to compute the earnings of the stockholders. Dividends are then subtracted to obtain the addition to retained earnings.

Most companies subtract the interest charges before they compute an income figure. This is definitely acceptable, but it should be realized that they are computing the earnings of the *stockholders* and showing that as the first income computation.[1] If interest charges are not subtracted, then the figure being shown is the income of the *corporate entity.* Both forms of income statement are illustrated here.

ABC COMPANY
INCOME STATEMENT
FOR YEAR ENDING
DECEMBER 31, 19—

Revenues		xxxxx
Less:		
Expenses	xxxx	
Losses	xxxx	
Taxes	xxxx	
Total Deductions		xxxxx
Net Income		xxxxx
Interest Charges		xxxx
Earnings of Stockholders		xxxxx
Dividends		xxxx
Addition to Retained Earnings		xxxxx

XYZ COMPANY
INCOME STATEMENT
FOR YEAR ENDING
DECEMBER 31, 19—

Revenues		xxxxx
Less:		
Expenses	xxx	
Losses	xxx	
Taxes	xxx	
Interest Charges	xxx	
Total Deductions		xxxx
Earnings of Stockholders		xxxx
Dividends		xxx
Addition to Retained Earnings		xxxx

If the XYZ Company's type of statement is used, then interest charges are properly closed to the expense and revenue summary rather than the income summary. Income will then be the earnings of the stockholders and not the income of the corporation.

The Multi-step Income Statement. The single-step income statement previously illustrated has increased in popularity in recent years, but most corporations prefer to use some variant of the multi-step income statement. Used with moderation, subtotals are desirable, but a large number of subtotals tend to detract from the more important figures. The multi-step income statement illustrated here has several desirable features. For example, it isolates factors that are extraordinary and nonrecurring in nature, and it computes a gross profit figure (sometimes called gross margin), which for certain purposes is useful. Although the multi-step income statement is sound, a valid objection to it is that it tends to become more complicated and cluttered than the single-step statement, thus adding to the complexity of financial reports.

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[1] The term "Earnings of the Stockholders" is not exact. Following a strict entity interpretation, the stockholders do not realize earnings until they receive dividends or sell their stock.

THE MULTI-STEP CORPORATION

INCOME STATEMENT

FOR YEAR ENDING DECEMBER 31, 19—

Sales		$100,000
Less:		
Sales Discounts		4,000
Net Sales		$ 96,000
Deduct Cost of Goods Sold:		
Beginning Inventory	$10,000	
Purchases	50,000	
Freight-in	1,000	
	$61,000	
Less Ending Inventory	11,000	
Cost of Goods Sold		50,000
Gross Profit on Sales		$ 46,000
Deduct:		
Selling Expenses	$18,000	
Administrative Expenses	12,000	30,000
Net Operating Income		$ 16,000
Add Other Income:		
Interest Revenue		4,000
Net Operating Income plus Other Income		$ 20,000
Other Deductions:		
Interest Charges		1,000
Net Income Adjusted for Other Items		$ 19,000
Adjustments of Prior Periods:		
Adjustment of Taxes		11,000
Net Income Before Federal Income Tax		$ 8,000
Federal Income Tax		5,000
Net Income		$ 3,000

Revenues and Income. There is frequently confusion concerning the terms *revenue* and *income. Revenue is a gross concept* and is measured by the assets received (or reduction in liabilities) in return for goods and services which are sold. The equities of the owners are not increased by the total revenues but are increased only by the amount left over after deducting the expenses, losses, and taxes incurred while gaining the revenues. This *residual* is called *income.* The terms *revenue* and *income* cannot be used interchangeably.

Revenue Recognition—Cash or Accrual Basis. When should revenue be recognized? When the sale order is taken, the goods are shipped, the cash is received, or when? It is generally agreed that the mere taking of an order is not justification for recording revenue. The order may be canceled in many situations in which the party who received the order will not be able to enforce it or to collect damages (there not being any). The receipt of cash may not be the moment for recording revenues, especially if the service has not been performed or the goods shipped. Following the *cash basis* for recognition of revenues, the receipt of cash is the moment for recording revenues if the service has been performed or the goods shipped.

The majority of corporations are not on the cash basis. The receipt of cash is *not* the signal for the recognition of revenue. Rather they are on the *sales and accrual basis.* Revenues are recognized as the sales are made, even though cash has not been received. Thus the sale of merchandise on account to a customer is recognized as revenue even though the cash has not been received (the debit is to accounts receivable, the credit to sales). Interest on investments held is recorded as it is earned, not as it is received (the debit is to interest receivable, the credit to interest revenue). The general rule is that the revenue should be recognized when the service is performed or the goods shipped.

It may be assumed that the sales accrual system is being used in this text except where it is specifically stated that another system is being used.

The Going Concern and Entity Conventions. Two accounting conventions that figure prominently in the measurement and presentation of the results of operations are the going concern and entity conventions.

For what does the accountant account? It may be assumed that the accountant is accounting for the *corporate entity.* The corporation has been declared by the courts to be a separate entity, and the corporation itself has legal rights and responsibilities separate from those of the stockholders. Since the corporation is a *separate entity,* the accountant attempts to distinguish between the corporation itself and the rights of the residual owners, the stockholders. The entity theory is the foundation of accounting for corporations, although there are occasions when a strict separate entity approach is ignored in favor of expediency. Earlier in this chapter two possibilities for presenting income statements were illustrated. One follows a strict entity approach and subtracts the earning of one group of capital contributors (the interest paid to creditors) *after* the computation of the corporate income. The second procedure focuses attention on that portion of the corporate earnings which increases the equity of the stockholders; it does not present the earnings of the corporate entity as such. The interest charges are subtracted before computing income; thus the income reported is the income of the stockholders.

The *going concern* convention is the justification behind the accounting treatment of many financial transactions. The accountant assumes that, lacking information to the contrary, the corporation has an infinite life, and that assets will *be used* in the normal course of operations and *not sold* at liquidation value. Thus the costs of organizing a corporation will often be treated as an asset of infinite life (organization costs) rather than as an expense. A long-lived asset such as a building is amortized and written off systematically to expense instead of being shown on the position statement at the amount of proceeds it would earn if sold as a piece of second-hand real estate.

Managerial Uses of the Income Statement. The income statement is a report of the results of the operations of the period and is probably the most important report prepared by the accountant.

Top management uses the income statement to judge the efficiency of operating personnel. This is especially true for income statements prepared to show not only the income of the corporation but also the income of components of the corporation (such as divisions or plants).

The income statement is one of the first indicators that managerial action is required. A decrease in income for a period may be caused by decreased sales, increased costs, changes in prices of items bought or sold, or many other factors. Whatever the cause, the decrease will be brought out by the income statement of the period, and it will be a signal for managerial action.

The frequency of preparation of income statements will vary, but it is not uncommon for firms to report income monthly. It is important that the reports be prepared frequently enough for management to take corrective action before a significant portion of the firm's assets are dissipated because of management's ignorance that losses are being incurred.

Earlier in this chapter it was suggested that the all-inclusive income statement had certain advantages over a procedure which allowed certain extraordinary items to bypass the income statement. For decision-making purposes, management is primarily interested in reports that show the results of the current period operations undistorted by special adjustments. The reports should be prepared with this in mind.

Some managerial decisions are made based on projected income statements showing what is expected to happen in the future. By using the projected statements, losses can sometimes be avoided altogether rather than merely stopped once they are started. The usefulness of a forecasted statement is, of course, dependent on the accuracy of the forecasts. Because of the tendency of crystal balls to be cloudy at best, the forecasted income statement may be expected to supplement, rather than replace, the income statement reporting the actual events which have occurred.

QUESTIONS AND PROBLEMS

7–1. The Cable Company (see Prob. 6–1).

Prepare an income statement for the year 1957. In this income statement distinguish between the income of the corporation and the earnings of the stockholders.

7–2. The Crane Company

THE CRANE COMPANY

SELECTED ACCOUNT BALANCES FOR THE YEAR 1957

Sales Revenues	$100,000
Interest Revenue	5,000
Interest Charges	3,000
Interest Receivable	2,500
Interest Payable	1,500
Dividend Charges	4,000
Manufacturing Cost of Sales	60,000
Administrative Expense	12,000
Selling Expense	8,000
Income Taxes	6,000
Fire Loss	4,000
Dividends Payable	1,000

Required

(a) Set up an expense and revenue summary and an income summary as they would appear after closing entries.

(b) Prepare an income statement for the year 1957.

7–3. The Crawford Company.

For each of the following transactions indicate whether it is the signal for recognition of revenue. Explain your conclusions. Assume that you are on the accrual basis of recognizing revenue.

1. An order is received from the X Company.
2. The goods ordered by the X Company are manufactured.
3. The goods ordered by the X Company are shipped (terms FOB shipping point).
4. The goods are received by the X Company.
5. Payment is received from the X Company.
6. The Crawford Company has held bonds for six months. The books are being closed today, but interest is to be paid tomorrow.
7. The Crawford Company bought some common stock on December 29; on December 30 a dividend was declared payable on January 15.
8. The dividend [see 7] is collected.
9. The interest [see 6] is collected.

7–4. The Culver Corporation

The following transactions occurred in the year 1957:

1. On January 1, 1957, stockholders paid $100,000 to the corporation for 10,000 shares of common stock.
2. The following items were purchased on account:

Merchandise	$65,000
Supplies	4,000

3. An amount of $3,900 was paid to the landlord. This included January, 1958, rent of $300.
4. Sales of $93,000 were made.

Cash Sales	$43,000
Sales on Account	50,000

5. Collection of accounts receivable, $39,000.
6. Payment of accounts payable, $60,000.
7. Wages paid during the year were $20,000. Wages payable as of December 31, 1957, were $300.
8. Insurance premiums paid during the year were $1,000. Prepaid insurance as of December 31, 1957, was $400.
9. Supplies used during the period, $3,100.
10. The merchandise inventory as of December 31, 1957, was $5,000.
11. Bonds were issued on July 1, 1957. The par value of the bonds is $10,000, and this amount was received from the investors. The bonds have a 6% rate of interest.
12. Income taxes for the year are $4,000. No income taxes were paid in 1957.

Required

(a) Record the above transactions, including adjusting entries, in "T" accounts.
(b) Prepare necessary closing entries.
(c) Prepare a position statement as of December 31, 1957.
(d) Prepare an income statement for the year ending December 31, 1957.

7–5. On December 1, 1958, the ABC Company began operations. During the month of December the total sales were as follows:

Cash Sales	$100,000
Sales on Account	50,000

A review of the record of cash disbursements indicates that the following funds were disbursed during the month of December.

Purpose of Expenditure	*Amount*
Merchandise	$ 60,000
Supplies	2,000
Wages and Salaries	30,000
Rent	7,900
Utilities (electricity for the first 15 days of the month)	100
	$100,000

An analysis of the payroll summary, receiving reports, and purchase invoices indicates the following amounts were owed as of December 31, 1958:

For Purchase of Merchandise	$70,000
For Purchase of Supplies	3,000
Wages and Salaries	7,000
Utilities	500
	$80,500

As of December 31 there were $40,000 of merchandise and $1,500 of supplies in inventory. The company owned no assets except cash and had no debts prior to December 1.

Required

(a) Prepare an income statement using the accrual procedure of revenue recognition.

(b) Determine the revenues if they are recognized on a cash basis. Prepare an income statement.

8

The Accounting Cycle and Accounting Records

BUSINESS TRANSACTIONS OCCUR continuously and are recorded continuously. Periodically they are summarized and reported. The sequence of accounting procedures to accomplish the recording and reporting of the transactions is often spoken of as being the *accounting cycle.* The accounting cycle consists of the following steps:

Obtaining Source Documents
Journalizing the Entries
Posting to the General Ledger
Obtaining Balances of Accounts
Preparing a Trial Balance
Adjusting Entries
Closing Entries
Preparation of Financial Statements

Obtaining Source Documents. In order to record financial transactions, it is necessary to establish a system which ensures that the accounting department will receive all relevant information. This information will usually take the form of reports or business paper of one type or another. The following are examples of some of the source documents:

Type of Entry	*Source Documents*
Recording Purchases	Purchase Invoices, Receiving Reports
Recording Sales	Sales Invoices, Shipping Reports

Merchandise Cost of Sales	Summary of Requisitions, Shipping Reports
Payment of Accounts Payable	Summary of Checks Written, Vouchers Authorizing Payment (a voucher is evidence which supports an entry; it may be only an invoice or a packet containing invoice, purchase order, receiving report, check number, etc.)

Journalizing the Entries. The journal is the book of original entry and focuses attention on the transactions. If there is a large volume of transactions taking place each month, it is more efficient for the information to be recorded in the ledger in summary, rather than recording each individual entry in the ledger. The journal accomplishes this summary. In the past, when bookkeeping was done manually, the journalizing process referred to a specific stylized procedure. Now a journal, instead of being in the traditional form, is frequently only a schedule. The entry for the week's payroll may be made from a machine listing of the workers' names, hourly wages, hours worked, payroll deductions, and take-home pay. Thus, while the nature of the journal changes, its function continues. The explanation of journals which follows is not directly applicable to all firms, but the general functions will be performed in all firms, although not following exactly the same procedures as illustrated.

The general journal commonly consists of a column to record the date, the account titles, the general ledger account numbers, and the amounts. Explanations are usually provided to support the journal entries.

Illustration

Date		Account	LF	Dr.		Cr.	
19—							
Jan.	15	Cash		$1,500	00		
		Accounts Receivable				$1,500	00
		To record the collection of cash from customers					

Instead of having one journal, it is often found to be more efficient to have several journals, one to record sales, another to record cash receipts, etc. These special journals allow more than one person to be engaged in recording transactions at the same time. They also lend themselves to a columnar arrangement which saves considerable time in journalizing and in posting.

Illustration of Columnar Journals

Cash Receipts Journal

(CR–1)

Date	Explanation	Bank Dr.	Accounts Receivable Cr.	Sales Cr.	Unclassified		
					Cr.	LF	Account
19— Jan. 15	Cash Collections	$1,500	$1,500				

Cash Disbursements Journal

(CD–1)

Date	Explanation	LF	Accounts Payable Dr.	Bank Cr.	Unclassified		
					Dr.	LF	Account
19— Jan. 15	Jones Co.		$34.67	$34.67			

Sales Journal

(S–1)

Date	Explanation	LF	Bank Dr.	Accounts Receivable Dr.	Sales—Cars Cr.	Sales—Repairs Cr.
19— Jan. 15				$403.32		$403.32

Purchases Journal

(P–1)

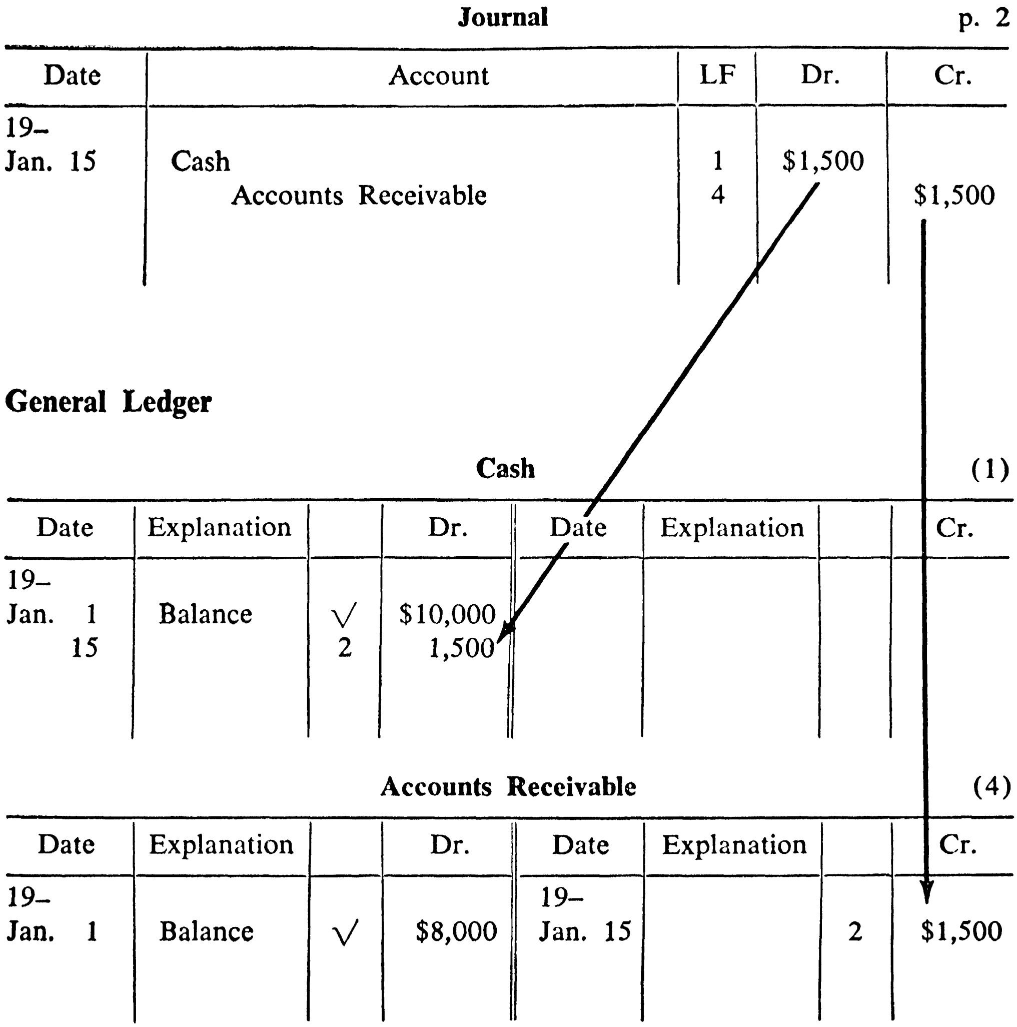
Date	Explanation	LF	Merchandise Dr.	Supplies Dr.	Unclassified			Accounts Payable Cr.
					Dr.	LF	Account	
19— Jan. 15	May Co.		$561.34					$561.34

The preceding journals assume that sales are made for cash and on account, purchases are recorded as payables before payment, cash payments are made using checks, and all cash receipts are deposited intact in the bank.

Posting to the General Ledger. From the journal the entries are transferred to the appropriate general ledger accounts. This process is called posting. The mechanical steps are:

1. Finding the proper account in the ledger.
2. Writing the amount in the correct column (debit or credit), the journal page which was the source, and the date.
3. Indicating in the journal the general ledger account to which the amount has been posted.

Illustration



Journal p. 2

Date	Account	LF	Dr.	Cr.
19– Jan. 15	Cash	1	$1,500	
	Accounts Receivable	4		$1,500

General Ledger

Cash (1)

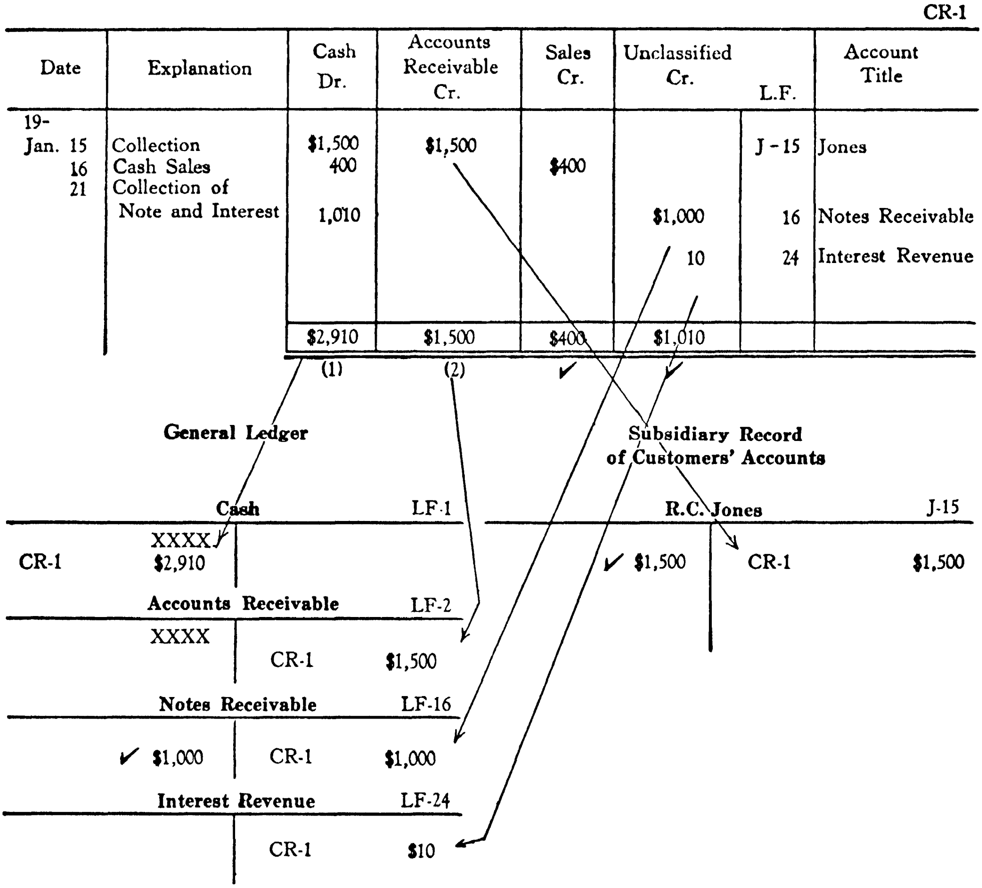
Date	Explanation		Dr.	Date	Explanation		Cr.
19– Jan. 1	Balance	√	$10,000				
15		2	1,500				

Accounts Receivable (4)

Date	Explanation		Dr.	Date	Explanation		Cr.
19– Jan. 1	Balance	√	$8,000	19– Jan. 15		2	$1,500

If the columnar journals are used instead of the two-column form of journal, the number of postings to the general ledger is considerably reduced. The columns headed with account titles should be posted in *total* to the general ledger or not posted at all. Certain of these columns would also be posted in detail to records of a subsidiary nature. For example, the accounts receivable column would be posted in total to the general ledger account, but it would be posted in detail to subsidiary records, indicating how much each individual customer owed. The unclassified column would be posted in detail to the general ledger to the specific ledger account identified in the account title column.

Illustration—Posting of a Columnar Cash Receipts Journal



CR-1

Date	Explanation	Cash Dr.	Accounts Receivable Cr.	Sales Cr.	Unclassified Cr.	L.F.	Account Title
19-							
Jan. 15	Collection	$1,500	$1,500			J-15	Jones
16	Cash Sales	400		$400			
21	Collection of Note and Interest	1,010			$1,000	16	Notes Receivable
					10	24	Interest Revenue
		$2,910	$1,500	$400	$1,010		
		(1)	(2)	✓	✓		

General Ledger
Cash LF-1
CR-1 XXXX $2,910
Accounts Receivable LF-2
XXXX CR-1 $1,500
Notes Receivable LF-16
✓ $1,000 CR-1 $1,000
Interest Revenue LF-24
CR-1 $10
Subsidiary Record of Customers' Accounts
R.C. Jones J-15
✓ $1,500 CR-1 $1,500

The check marks under the sales column and the unclassified column indicate that the totals of these columns were not posted to the general ledger. The sales column was not posted since the entry to the sales account is made from the sales journal rather than from the cash receipts journal. The unclassified column is not posted in total because there is no account in the general ledger called "Unclassified." Instead, this column is posted in detail to appropriate accounts such as notes receivable and interest revenue. When the amounts are posted, this fact is noted by writing the ledger account numbers in the LF column.

The $1,500 credit to accounts receivable is posted to the general ledger account "Accounts Receivable," and it is also posted in detail to the subsidiary record of customers' accounts (Account J–15).

It is possible to take advantage of the columnar form by having one journal in which the majority of repetitive transactions are recorded. Special entries may be recorded in the columnar journal by the simple expedient of having two special columns, an unclassified debit column and an unclassified credit column. With these two columns any transaction may be recorded in the columnar type of journal.

Obtaining Balances of General Ledger Accounts—Unadjusted Trial Balance. At the end of the accounting period the balance of each account in the general ledger should be computed. All accounts with balances should be listed. This list is called an *unadjusted trial balance.* If the debit column is equal to the credit column this indicates that the arithmetic has probably been correct, and that there has been an equality of debits and credits for each entry. If they are not equal, then the trial balance acts as an aid in preventing further entries which would only complicate the inevitable task of finding the errors.

Illustration

UNADJUSTED TRIAL BALANCE
AS OF DECEMBER 31, 19—

Account	*Dr.*	*Cr.*
Cash	$ 5,000	
Merchandise	4,000	
Accounts Payable		$ 6,000
Capital Received from Stockholders		2,000
Retained Earnings		500
Sales Revenues		7,500
Merchandise Cost of Goods Sold	6,000	
Other Expenses	1,000	
	$16,000	$16,000

Adjusting and Closing Entries: Post-Closing Trial Balance. The adjusting and closing entries are then journalized and posted to the general ledger. The balances of the accounts are determined and a post-closing trial balance is sometimes prepared. The post-closing trial balance should contain only position statement accounts.

Illustration

POST-CLOSING TRIAL BALANCE
AS OF DECEMBER 31, 19—

Account	*Dr.*	*Cr.*
Cash	$5,000	
Merchandise	4,000	
Accounts Payable		$6,000
Capital Received from Stockholders		2,000
Retained Earnings		1,000
	$9,000	$9,000

Preparation of Statements. The position statement may be obtained from the post-closing trial balance, since all relevant accounts appear on that schedule. The income statement cannot be obtained from the post-closing trial balance because all temporary accounts have been closed; however, it may be obtained by inspecting the expense and revenue summary. This has been explained in detail in Chapter 7.

Rather than make separate schedules for the various trial balances and statements, a worksheet is frequently prepared. This worksheet usually contains all information necessary for preparation of the financial statements. The use of a worksheet can eliminate much clerical effort.

Columns are needed to record the pre-adjusting entry trial balance, the adjusting entries, the adjusted trial balance, the income statement, and the position statement. The account balances are obtained by adding horizontally, taking into consideration whether the amounts are positive or negative (debits or credits).

The $4,000 balance in the merchandise account is obtained by subtracting the credit entry of $6,000 from the $10,000 debit balance. A zero balance arises in the prepaid rent account because there was an opening debit balance of $1,000, and a $1,000 credit entry was made to the account.

When a formal position statement is prepared the retained earnings shown should be $900 (the opening balance of $400 plus the $500 income of the period).

Control and Subsidiary Accounts. The amount that customers owe is actually recorded in two places. One is the control account in the general ledger which shows the total amount owed to the company by its customers. For every entry made in the control account, there is a similar entry made in an account in the subsidiary ledger. This subsidiary ledger is not part of the general ledger, and entries in it are not made so that debits equal credits, but rather the subsidiary ledger is kept in balance with the general ledger control account. The total of the account balances in the accounts receivable subsidiary ledger will equal the balance in the accounts receivable account in the general ledger. This statement is merely stating the truism that the whole is equal to the sum of its parts. The total owed to the company by its customers (general ledger) must be equal to the sum of all amounts owed by the individual customers (subsidiary ledger). The equality is maintained because no entries are made to the control account without also making entries to accounts in the subsidiary ledger. Thus if Mr. Jones pays $100, the cash account is debited, the accounts receivable account in the general ledger is credited for $100, and Mr. Jones' account in the subsidiary ledger is credited. This second credit is not made in the general ledger and therefore the general ledger debits equal the general ledger credits of the entry.

A problem arises when one or more of the accounts in the accounts receivable subsidiary ledger have credit balances. This may occur because

Illustration of a Work Sheet

Account	Unadjusted Trial Balance		Adjusting Entries		Adjusted Trial Balance		Income Statement		Position Statement	
Cash	$5,000	$	$	$	$5,000	$	$	$	$5,000	$
Merchandise	10,000			(1) 6,000	4,000				4,000	
Prepaid Rent	1,000			(2) 1,000						
Accounts Payable		6,000				6,000				6,000
Capital Received from Stockholders		2,100				2,100				2,100
Retained Earnings		400				400				400
Sales Revenue		7,500				7,500		7,500		
Merchandise Cost of Sales			(1) 6,000		6,000		6,000			
Other Expenses			(2) 1,000		1,000		1,000			
							$7,000	$7,500	$9,000	$8,500
Income (Increase in Retained Earnings)							500			500
Totals	$16,000	$16,000	$7,000	$7,000	$16,000	$16,000	$7,500	$7,500	$9,000	$9,000

Explanation of entries:

(1) To record the cost of the merchandise sold during the period.

(2) To record the expiration of the prepaid rent, and to record the rent expense of $1,000 (recorded as other expense).

of sales returns or allowances and advances by customers. In this situation the accounts receivable balance will not show the amount customers owe, but it will show the net of what customers owe and what the firm owes customers. This requires adjustment for position statement presentation.

Example

Assuming the following information, what amount should be shown as accounts receivable? As advances by customer?

General Ledger

Accounts Receivable

$1,000	

Accounts Receivable (Subsidiary Ledger)

Able

$600	

Roger

$500	

William

	$100

The subsidiary ledger and the general ledger are in agreement. The three subsidiary accounts have a net debit balance of $1,000. However, the total amount owed to the company is $1,100, and the company owes William $100. Thus the accounts receivable should be shown as $1,100, and the advances by customers should be shown as $100 (a liability).

Subsidiary ledgers are used with other accounts in addition to accounts receivable. Some of the other accounts that will have subsidiary ledgers are accounts payable, inventories, fixed assets, and investments.

QUESTIONS AND PROBLEMS

8–1. The Cable Company (see Prob. 6–1).

Prepare a worksheet for the Cable Company, using the following columns:

- Trial Balance (pre-adjusting entries)
- Adjusting Entries
- Trial Balance (pre-closing entries)
- Income Statement
- Position Statement

8–2. The Cabot Corporation (see Prob. 6–2).

Prepare a ten-column worksheet for the Cabot Corporation, using the following columns:

Trial Balance (pre-adjusting entries)
Adjusting Entries
Trial Balance (pre-closing entries)
Income Statement
Position Statement

8–3. The Culver Corporation (see Prob. 7–4).

Prepare an eight-column worksheet, using the following columns:

Adjusting Entries and Transactions
Trial Balance (pre-closing entries)
Income Statement
Position Statement

8–4. The Corner Drug Store

The accountant of the Corner Drug Store is currently recording transactions in a two-column journal and then posting the transactions to the general ledger.

The store makes sales on account and for cash. Sales are classified into three categories: Food, Drugs, and General. The cost of goods sold is computed following a periodic procedure (an inventory is taken monthly). Purchases are made as the goods are needed. This results in deliveries being received daily. There are six employees, and they are paid weekly. All disbursements of cash are by check. All cash receipts are deposited intact daily. Rent is paid monthly.

Required: Design a columnar journal that can be used to record all transactions but which will reduce the amount of posting to the general ledger. You are limited to 12 money columns (columns in which dollar amounts are recorded). Use one column to record merchandise.

8–5. The Corner Drug Store (continued)

Assume that instead of one columnar journal, it is decided to use special journals. The following journals are decided upon:

General Journal (two-column journal)
Cash Receipts Journal
Cash Disbursements Journal
Sales Journal
Purchases Journal

Required

(a) Set up the required journals indicating the money columns required (also as to whether they are debit or credit columns) and the information columns required.

(b) For each journal indicate whether the columns would or would not be posted to the general ledger. In total or detail?

8–6. The Corner Drug Store (continued)

The following transactions occurred during the first week of January 1957:

Jan. 2 Sales on Account (all drug sales), $215.05. Sales for Cash, $155.90, (Drugs, $70.55; Food, $30.35; General, $55.00).

Collections, Accounts Receivable, $120.50.
Payments of Accounts Payable, $230.56.
Merchandise Received, $450.53.
January's Rent, $200 paid.

Jan. 3 Sales on Account (all drug sales), $203.20. Sales for Cash, $130.65, (Drugs, $30.05; Food, $40.60; General, $60.00).
Collections of Accounts Receivable, $204.58.
Payments of Accounts Payable, $395.09.
Merchandise Received, $348.53.
Supplies Purchased, $35.65.

Jan. 4 Sales on Account (all drug sales), $230.43. Sales for Cash, $364.00, (Drugs, $244.02; Food, $49.48; General, $70.50).
Collection of Accounts Receivable, $304.54.
Payment of Accounts Payable, $204.32.
Merchandise Received, $238.43.

Jan. 5 Sales on Account (all drug sales), $329.43. Sales for Cash, $200.00, (Drugs, $100.00; Food, $40.00; General, $60.00).
Collections of Accounts Receivable, $300.43.
Payment of Accounts Payable, $81.32.
Merchandise Received, $740.32.
Wages (for the week) Paid, $610.98.
Equipment Purchased on Account, $650.00.
Interest (on a loan paid to the bank), $43.00. (The interest had been accrued as a liability in the previous year.)

Required: Record the given transactions in special journals (see Prob. 8–5) and post to the general ledger.

8–7. The Chapman Company

Columnar Cash Receipts Journal (CR–1)

Date		Explanation	Cash Dr.		Accounts Receivable Cr.		Sales Cr.		Unclassified Cr.		LF	Account
1957												
Jan.	19	Cash Sales	$1,435	85			$1,435	85				
		Collections	604	08	$304	08						Parks
					300	00						Ott
		Proceeds of Note	1,010	00					$1,000	00		Notes Receivable
									10	00		Interest Revenue
Totals			$3,049	93	$604	08	$1,435	85	$1,010	00		

General Ledger (Selected Accounts)

Cash (1)

1957											
Jan.	18	Balance	√	$40,540	43						

Accounts Receivable (4)

1957											
Jan.	18	Balance	√	$30,439	76						

Notes Receivable (10)

1957											
Jan.	1	Balance	√	$1,000	00						

Sales (32)

						1957					
						Jan.	18		√	$32,045	54

Interest Revenue (33)

Subsidiary Record of Customers Accounts

I.C. Parks (P–45)

1957											
Jan.	1	Balance	√	$304	08						

M.Y. Ott (O–23)

1957											
Jan.	1	Balance	√	$560	00						

Required: Describe how the cash receipts journal should be posted to the general ledger and the subsidiary ledger.

8–8. The Triangle Television Shop

The Triangle Television Shop sells and services television sets. Sales are made on account and for cash. Sales are classified into two categories, "Sales-Merchandise" and "Service Revenue." The cost of goods sold is computed following a periodic inventory procedure. An inventory is taken monthly. Purchases are made as merchandise and supplies are needed. This occurs four or five times a week. There are ten employees, and they are paid weekly. All disbursements of cash are by check. All cash receipts are deposited intact daily. Rent is paid monthly. The company uses the following journals:

General Journal (two columns)
Cash Disbursement Journal (three money columns)
Cash Receipts Journal (four money columns)
Purchases Journal (four money columns)
Sales Journal (four money columns)

The January 1, 1959, trial balance was as follows:

Bank	$ 1,000	
Accounts Receivable	3,000	
Merchandise	6,000	
Supplies	1,200	
Prepaid Rent	300	
Accounts Payable		$ 400
Wages Payable		600
Capital Received from Stockholders		10,000
Retained Earnings		500
	$11,500	$11,500

Transactions for the first week of January were as follows:

Jan. 2 Sales, Merchandise, $500 (all on account)
Service Revenue, $200 (all for cash)
Merchandise Received, $1,000

Jan. 3 Sales, Merchandise, $700 (all on account)
Service Revenue, $250 (all for cash)
Supplies Received, $200
Collection of Accounts Receivable, $500

Jan. 4 Service Revenue, $350 (all for cash)
Collection of Accounts Receivable, $400
Payment of Accounts Payable, $400

Jan. 5 Sales, Merchandise, $500 ($400 for cash, the remainder on account)
Service Revenue, $150 (all for cash)
Merchandise Received, $2,000
Supplies Received, $100
Collection of Accounts Receivable, $300

Payment of Accounts Payable, $1,000
Payment of Week's Wages, $900 (plus wages of $600 owed as of January 1)

Summary of transactions for the remainder of the month were as follows:

Jan. 6–31 Sales, Merchandise, $8,000 ($7,000 on account)
Service Revenue, $4,000 (all for cash)
Merchandise Received, $9,000
Supplies Received, $1,500
Collection of Accounts Receivable, $6,500
Payment of Accounts Payable, $8,600
Payment of Wages, $2,600 (as of January 31, wages of $300 are owed to the workers.)
Rent Paid for February, $300

An inventory of merchandise and supplies as of January 31 indicates that there is $10,000 of merchandise and $700 of supplies on hand.

Required

(a) Set up general ledger accounts with the beginning balances obtained from the January 1 trial balance.
(b) Record the transactions for the period Jan. 1–31 in the journals.
(c) Total and prove each journal (see that the debits equal the credits for each journal).
(d) Post to the general ledger. Cross reference.
(e) Prepare a worksheet. Include columns for the income and position statement.
(f) Prepare an income statement for January and a position statement as of January 31, 1959.

8–9. The subsidiary record of accounts receivable showed the following balances:

Alison	$15,000	
Bates	22,000	
Carnes	13,000	
Williams	10,000	(credit balance)

The control account, accounts receivable, had a balance of $40,000.

Required: Explain how accounts receivable should be presented on the position statement.

9

The Flow of Costs: A Manufacturing Firm

IF A FIRM is engaged in a manufacturing process, there arises a need for several accounts which are not required for a merchandising firm. The management is interested not only in the material purchased and sold, but also in the value of the raw materials, the goods in process, and the finished goods. These items are affected not only by purchased materials, but also by various *costs* which are connected with the manufacturing process. Examples of the manufacturing costs generally assigned to inventory are factory labor, depreciation of factory, manufacturing supplies, materials, and the costs of various service departments. The major problem which the accountant must solve is the tracing of these costs as they flow through the manufacturing process. The problem will be solved in general terms in this chapter; later chapters will develop more complex cost accounting techniques.

Recording of Costs and the Transfer to Work in Process. Costs are first recorded in accounts which clearly indicate the basic nature of the item. Thus we find such cost accounts as:

Factory Labor, Direct
Material, Direct
Supplies, Manufacturing
Factory Labor, Indirect
Power Cost
Depreciation Cost

The first two items of the list are *direct* costs, since they can be identified with the end product. The other items are *indirect* costs or *overhead* costs, since they cannot be readily and directly identified with the product. The direct material and direct labor may be transferred from labor or inventory accounts to a work-in-process account. The overhead items are first transferred to a manufacturing overhead account and then transferred to the work-in-process account. The process is called *absorption of overhead by product.* The absorption is accomplished by various means, but for purposes of this discussion it is assumed that overhead is applied on the basis of direct labor dollars, i.e., for each dollar of direct labor a certain predetermined amount of overhead is applied to work in process. The debit for this entry is to work in process; the credit is to the manufacturing overhead account.

Thus we have transferred three items to work in process:

Direct Material
Direct Labor
Manufacturing Overhead

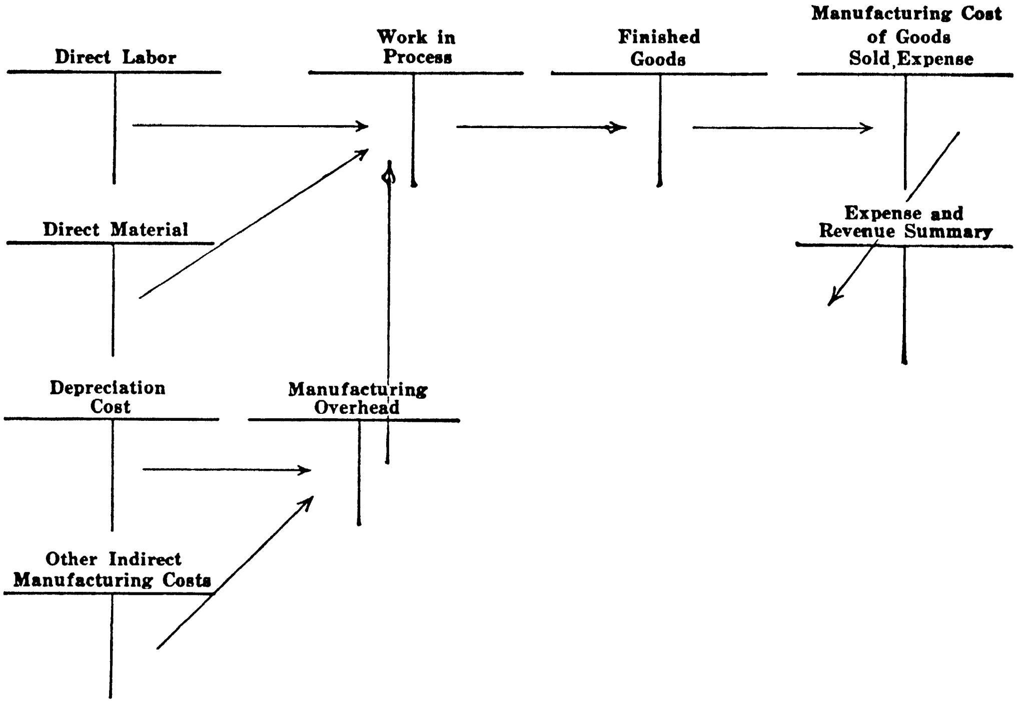
It should be noted that the costs are first recorded in cost accounts and then transferred to a work-in-process account. All these cost accounts are "asset" accounts. The costs associated with the manufacture of the goods are not recognized as expenses until the goods are sold. In this way all the expenses of earning the sales revenues are matched against the revenues in order to compute the income of the period.

The manufacturing overhead (sometimes called *burden* or *indirect manufacturing costs*) is transferred to work in process based on the overhead absorption rate. The direct labor is transferred to work in process as the necessary information is obtained from labor reports. The types of information which have to be known are: the department, the job order number, the process or product being worked on, the number of hours and type of work performed, the hours of overtime, and the hourly rate. The transfer of material to work in process is accomplished through a summary of material requisitions. This summary tells the type of material, physical units, unit price, dollar value, and the department, job, process, or product which received the material.

The Transfer to Finished Goods. As the goods are completed and come off the production line, they should be either mechanically or physically counted. This gives a count of goods finished during the day. At the end of the day this information is summarized, sent to accounting, and becomes the basis of the entry transferring work in process to finished goods. It should be noted that the accounting entries follow the physical flow of materials and other costs through the production process.

The Transfer to Manufacturing Cost of Goods Sold. When the goods are shipped to customers, they are transferred from finished goods to manufacturing cost of goods sold. The basis of this entry is a summary prepared at the end of the day by the shipping department. The relevant information for this entry consists of the units of product shipped, classified by type of product, and the cost of each type of product.

The Flow of Manufacturing Costs. The information contained in the preceding sections may be simply illustrated by using the accompanying flow chart.


Direct Labor
Work in Process
Finished Goods
Manufacturing Cost of Goods Sold, Expense
Direct Material
Expense and Revenue Summary
Depreciation Cost
Manufacturing Overhead
Other Indirect Manufacturing Costs

The arrow from direct labor to work in process represents the following journal entry:

Work in Process	xxxx	
Direct Labor		xxxx
To transfer the direct labor to work in process		

In like manner each arrowhead represents a *debit;* and each *tail* of an arrow, a *credit* entry.

Example

The Sample Company produces only one type of product and uses a single work in process account.

The following operating and cost data apply to the month of December 1957.

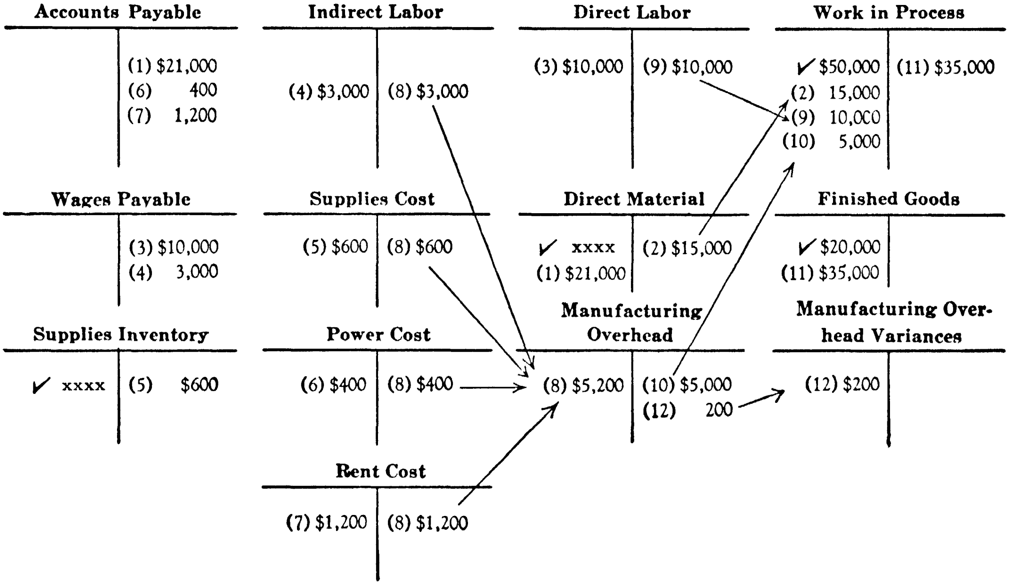
1.	Material purchased on account	$21,000
2.	Materials used in production	15,000
3.	Direct-labor costs incurred	10,000
4.	Indirect-labor incurred	3,000

5.	Supplies used in production	600
6.	Power cost incurred on account	400
7.	Rent expense incurred on account for the manufacturing plant	1,200

The beginning inventory in work in process is $50,000. The ending inventory in work in process is $45,000.

Manufacturing overhead is applied to product (to work in process) at the rate of $0.50 per direct-labor dollar. Any balance in the manufacturing overhead account, after the application of overhead, is closed to a manufacturing overhead variance account.

Required: Record the foregoing information.
Solution: The information is recorded in the following "T" accounts.


Accounts Payable
(1) $21,000
(6) 400
(7) 1,200
Indirect Labor
(4) $3,000
(8) $3,000
Direct Labor
(3) $10,000
(9) $10,000
Work in Process
✓ $50,000
(2) 15,000
(9) 10,000
(10) 5,000
(11) $35,000
Wages Payable
(3) $10,000
(4) 3,000
Supplies Cost
(5) $600
(8) $600
Direct Material
✓ xxxx
(1) $21,000
(2) $15,000
Finished Goods
✓ $20,000
(11) $35,000
Supplies Inventory
✓ xxxx
(5) $600
Power Cost
(6) $400
(8) $400
Manufacturing Overhead
(8) $5,200
(10) $5,000
(12) 200
Manufacturing Overhead Variances
(12) $200
Rent Cost
(7) $1,200
(8) $1,200

Explanation of Entries on Illustration

1–7, keyed to the given transactions.
8, transfers indirect costs to the overhead account.
9, transfers direct labor to work in process.
10, application of overhead to product ($10,000 × $.50 = $5,000).
11, transfer to finished goods ($80,000 — $45,000 = $35,000).
12, records the transfer of the overhead variance to the variance account.

Balances in Manufacturing Overhead. If a predetermined rate is used to transfer overhead to work in process, there will invariably be a balance in the manufacturing overhead account at the end of the accounting period. Some accountants suggest that this balance be carried forward from month to month and then closed out at the end of the year. Others advocate closing this account monthly. There is also the problem of how to interpret a balance in the account. It is possible to view it as a loss (if a debit balance) or a gain (if a credit balance) and to close it to a "variance" account, and then close the variance account to the expense and revenue summary. Another possible interpretation is to view a balance as an adjustment to both inventory and cost of goods sold. This interpretation assumes that the original estimates upon which the overhead rates were set are faulty, and corrects the amount of overhead charged to the product.

There is no clear-cut answer to the question as to which of the above options is "correct," and this is not the place for a development of all the pros and cons. Thus we shall ignore valid objections to the procedure, and for the present we shall close the balance in the overhead account at the end of each period to the expense and revenue summary, unless the unabsorbed overhead clearly arises from improperly set overhead rates.

Other Expenses. A manufacturing firm will incur other costs in addition to the costs arising from the manufacturing process. These expenses are classified as to whether they are "administrative" or "selling" expenses. Unlike the manufacturing costs, which are considered "inventoriable" (i.e., are run through work in process and do affect the amount shown in inventory), administrative and selling costs are commonly considered "period" costs and are charged to expense in the period in which they are incurred. If a portion of the administrative costs can logically be associated with the manufacturing process, then there is justification for considering at least a percentage of the administrative costs as manufacturing overhead and recording it in that account.

Administrative and selling expenses are first recorded in "natural" expense accounts and then closed to the "functional" expense accounts in the same manner as manufacturing costs.

Examples of Natural Accounts for Selling Expenses

Depreciation of Office Equipment
Travel Expense
Salesmen Salaries
Office Rent
Office Supplies
Secretarial Services

Examples of Functional Expense Accounts for a Manufacturing Corporation

Manufacturing Cost of Sales
Selling Expense
Administrative Expense

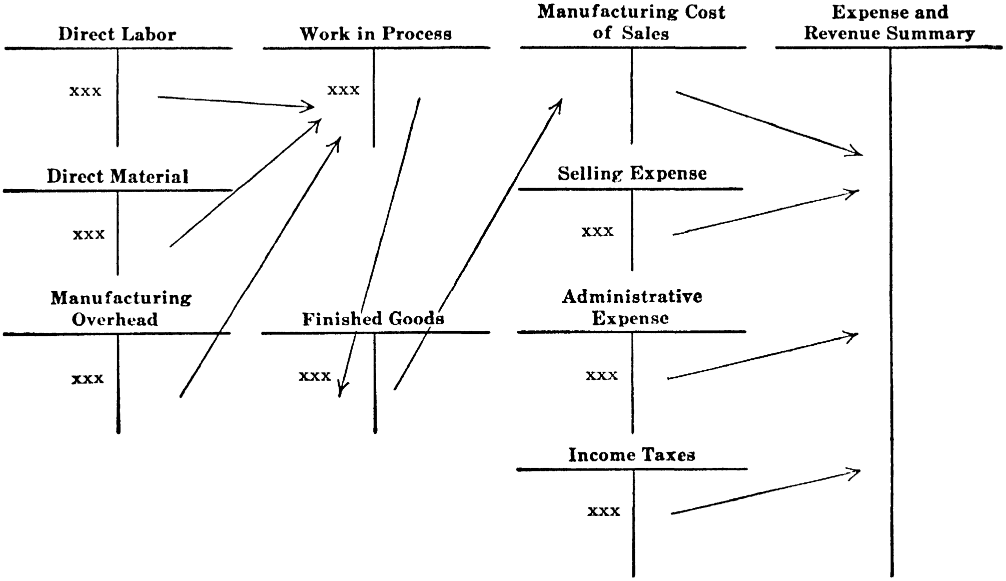
Some accounting systems are so set up that the information as to the natural and functional classification of costs is accomplished by just one recording of the cost. Accounts (or codes) are established for the three functional classifications; for example:

	Code
Manufacturing Cost of Sales	10
Selling Expense	20
Administrative Expense	30

Codes are also established for each of the natural classifications:

Office Supplies	11
Secretarial Services	21

Office supplies used by the selling force are coded 20–11. Office supplies used by the administrative force are 30–11.


Direct Labor
xxx
Work in Process
xxx
Manufacturing Cost of Sales
Expense and Revenue Summary
Direct Material
xxx
Selling Expense
xxx
Manufacturing Overhead
xxx
Finished Goods
xxx
Administrative Expense
xxx
Income Taxes
xxx

QUESTIONS AND PROBLEMS

9–1. The Welk Company produces only one type of product and uses a single work in process account.

The following operating and cost data apply to the month of December, 1957:

1.	Materials purchased on account	$14,000
2.	Materials used in production	$12,000
3.	Wages, direct labor	$6,000
4.	Wages, indirect labor	$2,000
5.	Supplies purchased on account	$1,500
6.	Supplies used in production	$1,000
7.	Taxes on plant and machinery	$900

8.	Power purchased on account and consumed in manufacturing	$600
	Units of product completed in December, 1957	10,000
	Units of product sold in December, 1957	8,000

There were no beginning inventories of work in process or finished goods and no ending inventory of work in process. The actual overhead incurred is applied to product (transfer all manufacturing overhead to work in process).

Required: Set up the following accounts in "T" account form and in proper flow sequence, and record the operating data for December, 1957.

Material
Accrued Payroll
Direct Labor
Indirect Labor
Taxes Payable
Cost of Sales
Supplies Inventory
Work in Process
Power
Finished Goods
Accounts Payable
Taxes
Supplies Used
Manufacturing Overhead

9–2. The Williams Company produces only one type of product and uses a single work in process account.

The following operating and cost data apply to the month of January, 1958.

1.	Materials purchased on account	$13,000
2.	Materials used in production	$11,000
3.	Wages for direct labor	$9,000
4.	Wages for indirect labor	$4,000
5.	Production supplies purchased on account	$1,000
6.	Production supplies used	$1,000
7.	Income taxes	$2,000
8.	Salaries, selling	$5,000
9.	Salaries, administrative	$3,000
	Units of product completed in January, 1958	10,000
	Units of product sold in January, 1958 (at a price of $5 per unit)	5,000

There were no beginning inventories and no ending inventory of work in process. Manufacturing overhead is applied to product (to work in process) at the rate of $0.40 per direct-labor dollar. There is no beginning inventory of finished goods.

Required: (a) Set up the following accounts in "T" account form and in proper flow sequence, and record the operating data for January, 1958.

Material
Accrued Payroll

Direct Labor
Indirect Labor
Taxes Payable
Cost of Sales
Supplies Inventory
Work in Process
Sales
Finished Goods
Accounts Payable
Taxes, Income
Supplies Used
Manufacturing Overhead
Selling Expense
Administrative Expense
Accounts Receivable
Retained Earnings
Manufacturing Overhead, Variance

(b) Record the closing entries.

9–3. The Wilson Company manufactures one product. The company closes its books on December 31 of each year. You accumulate the following information applicable to the year 1957:

The company has incurred the following expenses as a result of its manufacturing operations:

Materials	$20,000
Direct Labor	18,000
Other Factory Costs	9,000

The Wilson Company rents its factory building at a cost of $12,000 a year. The company's administrative offices occupy one-sixth of the building's floor space, and it has been decided to treat one-sixth of the rent as administrative expense. The remainder is regarded as a cost of manufacturing. All other administrative expenses total $15,000 for the year 1957.

Selling expenses for this period, the salaries of salesmen in the field, totaled $14,000.

The company utilizes only one work in process and one finished goods account. The work in process beginning inventory was $4,000; the ending inventory, $5,000. The finished goods beginning inventory was $10,000; the ending inventory, $8,000.

During the past year the company had sales of $70,000. All manufacturing overhead is applied to product.

Required: Set up "T" accounts showing the flow of costs and closing entries.

9–4. The Flow Corporation produces only one product and uses a single work in process account. On January 31 the following account balances existed:

Work in Process	$12,000
Finished Goods	6,000

The following information applies to the month of February:

Manufacturing supplies purchased on account	$ 2,000
Materials purchased on account	30,000
Material requisitioned and used	35,000
Manufacturing supplies used	1,800
Direct labor	40,000
Indirect labor	25,000
Administrative salaries	15,000
Selling, salaries	20,000
Administrative expenses (cr. Accounts Payable)	3,000
Selling expenses (cr. Accounts Payable)	2,500
Depreciation, factory building	1,000
Depreciation, equipment (manufacturing)	400
Power (amount metered during the month)	200
Inventory work in process, February 28	10,000
Inventory finished goods, February 28	8,000

Overhead is applied to product at a rate of $0.80 per dollar of direct labor. Twenty percent of the total administrative costs are assigned to the manufacturing process. Power is allocated 90% to manufacturing and 10% to administrative costs. Five percent of the depreciation of the factory building is to be allocated to administrative costs.

Required: Set up the necessary "T" accounts and record the given information for February. Assume that materials and supplies both had opening inventories. Close any balance in the manufacturing overhead account to "Overhead Variance." Show the manufacturing cost of sales.

10

Cash on Hand, Cash in Bank, and Marketable Securities

THE ACCOUNTING FOR cash and near-cash items is complicated by the fact that these items are especially susceptible to theft. Thus the job tasks and the accounting routines are designed to minimize the likelihood of such loss. It is not always possible to employ all the safeguards, usually referred to as *internal controls,* but the following are among the most important:

1. Deposit each day's receipts intact.
2. Disburse all significant amounts of cash by check.
3. Divide the job tasks so that the person receiving the cash does not record entries in the ledger or have access to customer accounts, etc.
4. Bank accounts should be reconciled by an employee who does not write checks or have access to cash.
5. Checks should be signed only by authorized personnel.

This list is by no means all-inclusive, but it does give an indication of the type of controls necessary to safeguard cash. The American Institute of Certified Public Accountants has published booklets on internal control which give more complete lists of internal control procedures. Standard textbooks on auditing or accounting systems are also good source books.

Petty Cash. All significant disbursements of cash should be by check, but there are occasions where the amount to be disbursed is so small that it is not worth the trouble of writing a check and preparing the necessary paper which accompanies any check. Thus firms will usually set up a petty cash fund of a stipulated amount of dollars. The fund is established by writing a check for the total amount of the fund. Cash is disbursed from the fund for various small purchases such as postage, travel advances, paying messengers, etc. When the cash remaining in the fund gets below a predetermined amount, the person handling the petty cash fund turns in a list of disbursements, along with the evidence of the disbursements, so that a check may be written to replenish the fund. The fund is replenished so that it again consists of the authorized amount of cash.

The total of the cash on hand and the itemized disbursements should at all times equal the authorized amount of the fund. If this sum is less than the authorized amount, then there is a cash shortage and this shortage should be investigated. Often there will be unauthorized items in the petty cash fund, such as IOU's or checks of employees. Another dangerous practice is to use the petty cash fund to cover relatively large disbursements. This procedure may bypass "red tape," but it also upsets the system of control designed to prevent theft.

At the end of the accounting period it may be the practice of the firm to replenish the petty cash fund. If the fund is not replenished, then its stipulated amount should be adjusted so that note is taken of the various expenses of the period.

Illustration of Entries for Petty Cash Fund

Petty Cash Fund	$100	
Bank		$100
To establish the petty cash fund		

Postage Expense	15	
Office Supplies	10	
Entertainment Expense	25	
Bank		50
To replenish the petty cash fund		

Office Supplies	8	
Travel Advances	20	
Entertainment Expense	12	
Bank		40
To replenish the petty cash fund at the end of the accounting period		

If the fund is not actually replenished at the end of the accounting period, then the entry to record the status of the fund would be:

Office Supplies	$ 8	
Travel Advances	20	
Entertainment Expense	12	
Petty Cash Fund		$ 40
To reduce the petty cash fund at the end of the accounting period		

Assume that at the end of the accounting period the following items were found in the petty cash fund:

Invoices for Office Supplies	$ 8
Receipts for Travel Advances	20
Entertainment Vouchers	12
Cash (in dollars and coins)	56
	$96

The total should be for $100. The petty cash custodian should be asked to explain the difference. If the shortage cannot be explained, then it is necessary to write it off as a loss. The entry would be:

Cash Shortage	$ 4	
Office Supplies	8	
Travel Advances	20	
Entertainment Expense	12	
Petty Cash Fund		$44

Bank Reconciliations. Each month it is necessary to reconcile the balance of the general ledger account "Cash in Bank," with the amount of money which the bank states that the customer has on deposit. Will the balance on the bank statement ever differ from the balance in the general ledger? Why? The following are the more common causes:

1. Checks Outstanding: recorded by company but not yet cleared by the bank
2. Deposits in Transit: recorded by company but not received by the bank
3. Service Charges: deducted by the bank but not yet recorded by the company
4. NSF Checks (not sufficient funds): deposited by the company, noted by the bank as being bad, but not yet received by the company
5. Errors: most commonly made by the company, although the bank can also make mistakes

Bank Reconciliation Procedure. Bank reconciliations are simple if they are attacked systematically. There are actually only two questions to be answered. Does the item affect the bank balance or the balance per books? Should it be added or subtracted? Apply this method to the following items:

1. Checks Outstanding: Affect the bank balance (they are already recorded by the company). They should be subtracted because the amount of cash is not available for further disbursement.
2. Deposits in Transit: Affect the bank balance (they are already recorded by the company). They should be added to the balance per bank because the deposits have been made but have not been recorded by the bank.
3. Service Charges: Affect the book balance (they are already recorded by the bank). They should be subtracted because the bank has already decreased the company's balance by the amount.

4. NSF Checks: Affect the book balance (they are already recorded by the bank). They should be subtracted because the bank has already decreased the company's balance by the amount (or has never increased it). NSF refers to "not sufficient funds."

Obviously journal entries will be required to bring the company's books into correct balance. The information for these journal entries will be found in the section of the bank reconciliation which deals with the balance per books.

Illustration

From the following information prepare a bank reconciliation and the necessary journal entries for the Sample Company.

Balance per Bank Statement, December 31, 19—	$12,250
Balance per Bank Account (General Ledger), December 31, 19—	10,000
Checks Outstanding	3,000
Deposit of December 31, 19— (not recorded by bank)	1,000
Deposit of December 26, 19— (customer collections, not recorded by company)	800
Bank Service Charges per Bank Statement	5
NSF Check (a customer check which was not honored)	545

SAMPLE COMPANY
BANK RECONCILIATION
AS OF DECEMBER 31, 19—

Balance per Books, December 31, 19—		$10,000
Add:		
Deposit of December 26, 19— (customer collections, not recorded)		800
		$10,800
Subtract:		
Bank Service Charges	$ 5	
NSF Check	545	550
Corrected Balance per Books, December 31, 19—		$10,250
Balance per Bank Statement, December 31, 19—		$12,250
Add:		
Deposit of December 31, 19—, in Transit		1,000
		$13,250
Subtract:		
Outstanding Checks (attach list)		3,000
Corrected Balance per Bank Statement, December 31, 19—		$10,250

Required Journal Entries

Bank	$800	
Accounts Receivable		$800
To record the deposit of December 26, not previously recorded		
Bank Service Charges	5	
Accounts Receivable	545	
Bank		550
To record the bank service charge and set up the NSF check as a receivable		

Note that all the journal entries are based on information obtained from the "book" section of the bank reconciliation.

Marketable Securities. Marketable securities are shown on the position statement immediately below cash. They include extremely liquid investments. In recent years short-term United States Treasury securities have been very popular with firms seeking to invest their funds in securities for which there is a ready market.

If the market price of the securities is lower than the cost, then it is generally accepted practice to write the securities down to market. If the market price of the securities is greater than the cost, the practice is either to do nothing or to show the market value in a footnote. It should be noted that, for managerial decisions (and any other decision being made), the significant figure is not the cost but rather the most recent market value of the securities.

Securities that are being held for investment purposes should not be classified as marketable securities but as investments. Investments are not classified as current assets but are shown in the position statement immediately below the current asset section. It is sometimes difficult to draw a sharp line distinguishing between investments and marketable securities. Investments are usually marketable, and marketable securities are generally thought of as being investments. Where then is the dividing line? Common stock held for *control purposes* should be classified as an investment and not included in the current section of the position statement. Other securities for which there is a market may be classified as current assets (marketable securities).

Management and Cash. The primary responsibilities of management with respect to cash are:

1. To prevent loss of cash due to fraud or theft.
2. To ensure that there is sufficient cash on hand so that the normal operations of the business are not interrupted because of a shortage of cash.

3. To ensure that cash is not sitting idle during periods in which there is a temporary excess of cash on hand.

The second and third items listed will be discussed jointly, since they represent one goal. The cash balance should be large enough to meet the needs for cash arising during the period, but there should be no excess cash sitting idle. Assuming that money costs 5% per year, then a million dollars idle for a year costs $50,000. If it is idle for a week, it costs over $950, and even a day's idleness costs well over $100.

The handling of cash should be carefully controlled so that idle balances are kept to a minimum. A million dollars may seem like a great deal of money to the average individual, but even medium sized corporations maintain bank balances of millions of dollars. In recent years corporations have been able to invest temporary excess funds in government securities, and there is reason to suspect that this market will be present in the future.

Disbursement of Cash: The Voucher System. One of the most important controls over cash is that in which all disbursements of material size must be made by check. The canceled check gives objective evidence of the purpose for which the disbursement was made. Another important control is the voucher system.

A voucher is evidence (most probably a serially numbered form) indicating why a payment was made. This evidence may consist of items similar to a purchase invoice, a post office receipt, or a payroll summary. The exact nature of a voucher may vary, but usually there will be a form indicating the number of the voucher, the purpose of the proposed disbursement, the amount to be disbursed, the account to be charged, and the authorization for payment. When the check is written, the voucher which is being paid will be recorded. Thus, to investigate why a check was written, one reviews the voucher for which the check was written. The voucher cover sheet will have attached to it the evidence necessary to justify and explain the writing of the check. Some voucher systems use the same serial number for both the voucher and the check. In fact the voucher cover is often written automatically as the check is written. This system has the advantage of facilitating the job of the person tracing the reason for the writing of a check, and it also reduces the labor connected with the preparation of a voucher.

If a voucher system is being used, each check written will have an authorized voucher explaining the reason for writing the check. This procedure helps ensure that only authorized checks are written and that any check can be explained by reference to the voucher file.

A voucher system has several bookkeeping implications. The specific liabilities may be classified as vouchers payable when the voucher is authorized for payment. When payment is made, vouchers payable is debited and bank is credited. A more popular procedure is to record only the disbursement. The specific liabilities (such as accounts payable, payroll, taxes payable) are not accrued except at the end of the accounting period. With this procedure the entries to the liability accounts are bypassed. The entry made to record the disbursement is to debit the various accounts such as merchandise, wages, supplies, etc., and credit bank. There is an implicit credit and debit to vouchers payable which is not recorded.

Illustration

Record Voucher 546, which authorizes payment of a tax liability (already recorded as a liability) of $50,000.

Taxes Payable	$50,000	
Vouchers Payable		$50,000

If a check is written to pay Voucher 546, then the following entry is made:

Vouchers Payable	$50,000	
Bank		$50,000

If the tax liability *had not* been accrued, then the following entry could be substituted for the entries made above (and also the entry originally made to accrue the tax liability).

Income Taxes	$50,000	
Bank		$50,000
To record the payment of the income taxes for the period; reference Voucher 546		

QUESTIONS AND PROBLEMS

10–1. The Dahlgren Company

Oct. 16 A petty cash fund is established. A check for $500 is written and given to the petty cash cashier.

Nov. 28 A check for $290 is written to replenish the petty cash fund. The vouchers turned in indicate that the funds were disbursed as follows:

Office Supplies	$180
Stamps	15
Delivery Service	25
Travel	50
Entertainment	20

Dec. 31 On December 31 the internal auditor checked the petty cash fund. He found the following items:

Cash (currency and coins)	$305
IOU from employee	12
A check signed by the cashier	100
Vouchers:	

Office Supplies	50
Travel	10
Entertainment	20

Required: Prepare journal entries to record the above transactions. Discuss the items found in the petty cash fund.

10–2. The Day Company

From the following information prepare a bank reconciliation as of December 31, 1957. Also prepare journal entries necessary to adjust the Day Company's records.

Balance per Bank Statement, December 31, 1957		$12,589
Balance per Account, Bank		9,683
Checks Outstanding:		
No. 346	$3,000	
No. 367	145	
No. 401	238	3,383
Deposit of December 31, 1957 (not recorded by the bank)		674
Bank Service Charges		12
Note Collected by the Bank for the Day Company (includes $15 interest)		2,015
NSF Check returned by the Bank with the Bank Statement		1,806

10–3. The Dayton Company

From the following information prepare a bank reconciliation as of December 31, 1957. Also prepare journal entries necessary to adjust the Dayton Company's records.

Balance per Bank Statement, December 31, 1957		$4,325.78
Balance per General Ledger		3,564.32
Checks Outstanding:		
No. 240	$ 9.00	
No. 245	25.00	
No. 578	49.00	
No. 579	11.00	
No. 580	15.00	109.00
Deposit of December 31, 1957 (not recorded by the bank		165.90
Bank Service Charges		4.50
Deposit (recorded by the bank as $2,911.89)		2,191.89
Check No. 560 (recorded by the company as $450)		540.00

Check No. 560 was in payment of Voucher 495.

A note of $192.86 (including $12.86 of interest) was collected by the bank on behalf of the Dayton Company. The collection has not been recorded as yet by the Dayton Company.

10–4. The Deca Company uses a voucher system to authorize cash disbursements. All payments are first "vouched" by the payable section. At this time the liability and the debit explaining the nature of the purchase are recorded. The list of authorized vouchers is then taken to the check disbursement section where the checks are written.

The following vouchers are authorized on January 15, 1957:

Voucher 310: For purchase of $390 of merchandise
Voucher 311: For travel expenses of $230
Voucher 312: For property taxes of $400

On January 16, 1958, three checks are written to pay Vouchers 310, 311, 312.
Required: Record the given information, using journal entries.

10–5. The Knight Company

As of November 30 the following checks were outstanding:

Check No. 301	$300
Check No. 534	250

During December checks Nos. 535–590 were written and were sent out in payment of vouchers 535–590. The bank statement for December included all checks from No. 534 to No. 588. Check No. 589 was for $100, and check No. 590 was for $60. Check No. 301 is still outstanding.

Other information:

Balance per Bank Statement, December 31, 1958	$4,649
Balance per Accounts, Bank	4,344
Bank Service Charges	5
NSF Check (returned by the bank with the bank statement; check was from a customer)	150

Required: Prepare a bank reconciliation as of December 31, 1958. Also prepare journal entries necessary to adjust the Knight Company's books.

10–6. The Knight Company has a petty cash fund with a set amount of $200. When the fund goes below $50, it is replenished by check. The voucher authorizing the check lists the nature of the expenditures made and the accounts to be charged. On December 31 the internal auditor conducted a review of the fund and found the following items:

Cash (currency and coins)		$120
An IOU (signed by the custodian of the fund)		9
Vouchers (signed by authorized personnel) for:		
Office Supplies	$15	
Travel Advances	20	
Entertainment	26	61
Two Theatre Ticket Stubs (cost $5 each)		10
		$200

Required: From the given information prepare journal entries which may be required.

11

Accounts Receivable and Sales

WHEN A SALE is made and cash is not actually received at the time of the sale, the sale is said to be made "on account." The entry that is made is a debit to an asset account, to record the fact that a customer owes the firm money, and a credit to a revenue account.

Accounts Receivable	$1,000	
Sales		$1,000
To record a sale on account		

A major difficulty in accounting for this transaction arises because not all the accounts receivable recorded as assets will actually be collected. When a firm does a large amount of credit business, it is practically a certainty that some accounts receivable will go bad and not be collected. If the firm did not receive a good asset, then the revenue should not have been recognized. However, neither at the time of recording the sale nor at the end of the accounting period does the accountant know which of the accounts receivable will go bad. Thus specific accounts receivable accounts cannot be credited, even though the accountant does know that a certain percentage of the accounts receivable arising from the credit sales of this period will go bad. He solves his dilemma by making use of *contra* accounts.

Contra and Adjunct Accounts. Instead of making entries directly to the primary account, the accountant sometimes finds it useful to employ accounts to record subtractions and additions to the primary account. These supplementary accounts are called "Contra Accounts" (subtractions from the primary account) and "Adjunct Accounts" (additions to the primary account).

Up to this point all accounts used could be placed into one of four general classifications:

1. Asset Account (a *real* account)
2. Equity Account (further split as to whether liability or stock equity; also a *real* account)

3. Revenue Account (a temporary account or *nominal* account)
4. Revenue Deduction (further split as to whether expense, loss, or tax, all of which are temporary accounts or *nominal* accounts)

The asset, equity, and revenue accounts may all have contra or adjunct accounts. If the primary account is increased by a *debit* (as are all asset accounts), then the contra account will be increased by a *credit*. If the primary account is increased by a credit (as are all equity and revenue accounts), then the contra account will be increased by a debit. The adjunct accounts will be just the opposite, for they are additions to the primary account.

Contra Asset and Contra Revenue Accounts. Contra asset accounts are increased by credits since they are *essentially decreases in assets*. All contra asset accounts may be classified as valuation accounts. When will valuation accounts be needed? They are used with accounts receivable to take note of the fact that some of the accounts receivable will not be collected; that is, they will become bad debts. Contra accounts are also used as valuation accounts with fixed assets; this will be taken up in detail in Chapter 13.

In this chapter the following contra accounts to accounts receivable will be studied:

Accounts Receivable: Allowance for Uncollectibles
Accounts Receivable: Allowance for Sales Returns
Accounts Receivable: Allowance for Sales Discounts

Each of the contra accounts to accounts receivable will be increased by credits, since they are essentially decreases to accounts receivable. What accounts are debited? The debit in each case is to a contra revenue account, since we are recording decreases to revenues.

Contra Revenue Accounts. Revenues are increased by credits; thus the contra revenue accounts are increased by debits. The main revenue account could be decreased directly in all of the following cases, but the use of a contra revenue account is chosen in order to preserve relevant information. Management should know what deductions are being made from gross sales for uncollectible accounts, sales returns, and sales discounts.

Accounts Receivable: Allowance for Uncollectibles. The accounts receivable—allowance for uncollectible accounts is a contra asset account, a subtraction from the main account (accounts receivable). It is established because not all the accounts receivable arising from this period's sales will be collected. Since all the sales did not actually generate assets, the revenues should also be decreased; thus the debit for the transaction is to a contra account to sales. The entry which should be made each period for that amount of sales and accounts receivable not expected to be collected is:

Sales: Adjustment for Uncollectibles	xxxxxxxx	
Accounts Receivable: Allowance for Uncollectibles		xxxxxxxx
To set up an allowance for uncollectibles for this period's sales		

It is possible that over a period of years the allowance may become too large or the bad debts may become so great that the allowance is too small. An adjustment should then be made. For example, assume that it is found by analyzing the age of the accounts receivable that the allowance account should be $10,000 greater. An entry should be made similar to the following:

Adjustment of Prior Year's Earnings	$10,000	
Accounts Receivable: Allowance for Uncollectibles		$10,000
To adjust the allowance for uncollectibles		

The nature of the allowance account should be noted. There is nothing actually set aside. A valuation of the accounts receivable is being made to take note of the fact that not all the accounts receivable will be collected. Why were sales made if the firm had not expected to collect them? When the sales were made, *it was expected that each account would be good*, but it was known that statistically some of the customers' accounts would become bad. The specific bad accounts were unknown. What is the significance of an overstatement of the allowance account? An overstatement means that incomes have been understated in the past, and thus the assets and retained earnings have been understated. A portion of the allowance is actually *retained earnings*! If the allowance account is understated, the asset accounts receivable is overstated, and retained earnings is overstated (the incomes of the past years have been overstated).

Determining the Year End Adjustment. At the end of the year (or other accounting period) it is necessary to make an entry increasing the allowance for uncollectibles account and decreasing this period's sales by the amount of sales which are not expected to be collected. As explained in the preceding section, the entry is:

Sales: Adjustment for Uncollectibles	xxxx	
Accounts Receivable: Allowance for Uncollectibles .		xxxx

How should the dollar amount for this entry be determined? There are several choices:

1. A percentage of total sales
2. A percentage of credit sales
3. An appraisal of the accounts receivable still outstanding at year end, the appraisal being based on the age of the accounts (the age indicating the quality)

The advantages of using a percentage of sales are that it is simpler, cheaper, and quicker than a detailed analysis of the accounts. But even if sales is used as the basis of determining the amount to be accrued for the period, the size of the allowance should be reviewed regularly to ensure that the allowance for uncollectible accounts is reasonable.

The sales should be multiplied by a percentage which past experience indicates to be realistic. If the percentage used is unrealistic, the allowance will become either too large or too small.

Should total sales or just credit sales be used as the basis for the computation? Credit sales is the better figure because the amount of uncollectible accounts can be expected to bear a better correlation with credit sales than total sales (where cash sales are included).

Aging Accounts Receivable. Even if the sales adjustment is computed by using a percentage of sales, the allowance for uncollectibles must be periodically compared with the accounts receivable outstanding. The most common procedure used is to age the accounts receivable. This means that the length of time the account has been outstanding will be taken into consideration in determining how large an allowance is needed.

The first step in this procedure is to array all accounts according to age and then to multiply the different groups by different percentages which reflect the likelihood of the accounts going bad.

Illustration

The Sample Company is reviewing the size of its allowance for uncollectibles. To accomplish this it has aged its accounts receivable and has multiplied each age group by percentages based on past experience.

Age Group	Dollar Amount of Accounts Receivable	Percentage Factor	Required Allowance for Uncollectibles
Up to 6 mos.	$5,000	1	$ 50
6 mos. to 1 yr.	3,000	5	150
1–2 yr.	1,000	20	200
Over 2 yr.	300	90	270
	$9,300		$670

Assume that the balance of the allowance account is $700. Prepare the required journal entry.

Accounts Receivable: Allowance for Uncollectibles	$30	
Adjustment to Prior Year's Earnings		$30
To adjust the allowance for uncollectible account		

If the balance of the allowance account prior to adjusting entries had been $170, then the following entry would be required:

Sales: Adjustment for Uncollectibles	$500	
Accounts Receivable: Allowance for Uncollectibles.		$500
To adjust the allowance for uncollectibles to a balance of $670		

There can be troublesome cases where it is questionable whether the entry should be made to the sales adjustment account or to an account adjusting a prior year's earnings. Where possible, an attempt should be made to identify the amount of the adjustment directly associated with this period's revenues. This is consistent with the principle of matching revenues and expenses.

Writing-off Bad Debts. When an account is actually determined to be uncollectible it should be written off. Now the specific account is known, and accounts receivable may be credited directly. The debit is to the contra account which had been set up just for this happening.

Accounts Receivable: Allowance for Uncollectibles	xxxxxx	
Accounts Receivable		xxxxxx
To write off a bad debt		

If the account is written off prematurely and it later turns out to be collectible, then the above entry may be reversed.

Accounts Receivable	xxxxxx	
Accounts Receivable: Allowance for Uncollectibles		xxxxxx
To record the fact that an account written off is collectible		

Cash	xxxxxx	
Accounts Receivable		xxxxxx
To record the collection		

The danger of having too large a balance in the allowance must be avoided when the entry made to write off the bad account is reversed. If this is likely to occur, then the credit should be to a "Bad Debts Recovered" account. This account is an adjustment of prior years' earnings and, with the single-step income statement, is added to the revenues of the period.

There are many accountants who prefer not to set up an allowance for uncollectibles but to debit "Bad Debt Expense" when the account actually goes bad. This is an incorrect procedure because assets are overstated and revenue deductions are not being matched with revenues. The debit to "Bad Debt Expense" may also be made merely as a substitute for the debit to the sales adjustment for uncollectibles account. This latter procedure is not so harmful as the former, but it does assume that bad debts are an expense instead of a deduction from gross revenues. Assume that $75 worth of merchandise is sold on account for $100. What is the expense of making the transaction? If the $100 is collected, the expenses are $75. If the $100 is not collected, are the expenses $175 ($100 bad debts plus $75)? The total net revenues and total expenses will be dependent on the procedure followed. In one case, revenues are decreased by $100 (debiting a sales contra), and in the second case, expenses are increased by $100. The routes are different, but the end result is the same.

Recording Sales Returns. It is not surprising that after a sale has been seemingly made, the customer frequently finds that the purchased article is not suitable and returns it to the seller. The fault may rest in the purchased article (the goods were damaged or not as advertised), or there may be just a change of heart on the part of the customer. In any event if the return is allowed by the seller, a series of accounting entries is required. Essentially all that is being done is a reversal of the entries made to record the sale, and a recognition of any "cost of returns" which were incurred. One difficulty arises because the seller may be using either a periodic or a perpetual inventory procedure. The entries made to record the return will depend on the entries made at the time of sale.

Illustration

Goods that cost $80 are sold on account for $100. Two days later the goods are returned and credit is given to the customer. The returned merchandise has a value of $50.

Assuming the company uses a *periodic* inventory procedure:

Accounts Receivable	$100	
Sales		$100
To record the sale		
Sales Returns	100	
Accounts Receivable		100
To reverse the entry made to record the sale; a contra account is used to reduce sales so that the total sales returns will be known		
Cost of Returns Expense	30	
Merchandise		30
To note the fact that the merchandise has decreased in value from $80 to $50		

Assuming the company uses a *perpetual* inventory procedure:

Accounts Receivable	$100	
Cost of Goods Sold	80	
Sales		$100
Merchandise		80
To record the sale and recognize the cost of goods sold		
Sales Returns	100	
Accounts Receivable		100
To reverse the entry made to record the sale, but using a sales contra account to decrease sales		
Merchandise	50	
Cost of Returns Expense	30	
Cost of Goods Sold		80
To decrease cost of goods sold for the amount charged to it at time of sale; to increase merchandise by the value of the returned merchandise and to recognize the expense of returns		

If the seller uses a periodic inventory procedure, then the entries to record the sales return are made with this in mind. This will usually mean that no entry has to be made concerning cost of goods sold, since at the time of sale no entry was made to record the cost of sales (using the periodic inventory procedure the cost of sales is recognized at the end of the accounting period after the taking of a physical inventory). If the seller uses a perpetual inventory procedure, then the entry to record cost of sales has been made at the time of sale, and appropriate entries must be made to reverse the cost of sales entry if the merchandise is returned.

Accounts Receivable: Allowance for Sales Returns. At the end of the accounting period an estimate may be made of the accounts receivable which will not be collected because the merchandise sold will be returned. A whole series of entries will be triggered by this assumption:

Sales: decreased by the amount of the sales price of the expected returned merchandise (debit, sales returns)

Accounts Receivable: decreased by the amount of the receivable expected not to be collected (credit, accounts receivable—allowance for sales returns)

Cost of Goods Sold: decreased by the cost of the merchandise expected to be returned (credit, cost of goods sold)

Merchandise Inventory: increased by the value of the merchandise to be returned (debit, estimated merchandise returns)

Cost of Returns Expense: increased by the amount of the estimated decrease in the value of the merchandise (debit, cost of returns expense)

Example

Accounts receivable of $1,000 is expected not to be collected because of sales returns. The cost of goods sold is approximately 80% of sales, and the value of returned merchandise is estimated at 60% of the cost. Record the adjusting entry required to take note of this information:

Sales Returns	$1,000	
Estimated Merchandise Returns	480	
Cost of Returns Expense	320	
Accounts Receivable: Allowance for Sales Returns		$1,000
Cost of Goods Sold		800

This entire procedure requires evaluation. Essentially the purpose of the procedure is to prevent an overstatement of assets and earnings for the period. In the preceding example the result of the entry was to reduce accounts receivable by $1,000, increase inventory by $480, and decrease the profits which would have been reported by $520 (decrease in sales $1,000, plus the increase in cost of returns $320, minus the $800 decrease in cost of goods sold). To accomplish these results, a series of assumptions had to be made. It is assumed that sales returns can be predicted and that application of averages for cost of goods sold and value of returned merchandise will give acceptable results. Most business firms avoid the necessity of making these assumptions by ignoring the necessity for the entry. If returns are a small percentage of sales, this is not an objectionable procedure. If returns are a large percentage of sales, then it is necessary for the accountant to decide whether or not the entries illustrated here have to be made to avoid misleading information.

Accounts Receivable: Allowance for Sales Discounts. Frequently discounts are offered for prompt payment of accounts. Thus the terms of a sale may be 2/10, n/30. This reads "two ten, net thirty," and it means that the customer may take a 2% discount if payment is made within 10 days, but in any event, the *total* amount has to be paid within 30 days. If the sales are recorded by using a net price procedure, then the recording is relatively simple.

Example

Recording sales using net price procedure: gross price $100; terms, 2/10, n/30; date of sale, July 5.

July 5	Accounts Receivable	$98	
	Sales		$98
	To record sale using the net price of $100 − $2		
14	Cash	98	
	Accounts Receivable		98
	To record collection within the discount period		

If payment is not made until the discount period has lapsed, and the full $100 has to be paid by the customer, then the entry would be:

July 26	Cash	$100	
	Accounts Receivable		$98
	Lapsed Sales Discount Revenue		2
	To record the collection after the discount period has lapsed		

If the accounting period ends before the payment is received but after the discount has lapsed, then the below entry may be made:

Dec. 31	Accounts Receivable	$2	
	Lapsed Sales Discount Revenue		$2
	To record the lapsed sale discount revenue		

Frequently the above refinement is not made because the lapsing of the discount may be an indication that the account is not good and that further revenues should not be recognized.

Instead of recording sales by using net prices, gross prices are frequently used. With the gross price procedure, the need for the contra asset and contra revenue accounts occurs. The following entries are for the same situations as illustrated in the example, but here the gross price procedure of recording sales is used.

Example

Recording Sales, Using the Gross Price Procedure:

July 5	Accounts Receivable	$100	
	Sales		$100
	To record the sale, using the gross price of $100		
14	Cash	98	
	Sales Discounts	2	
	Accounts Receivable		100
	To record collection within the discount period, the reduction of accounts receivable, and the taking of the sales discount		

If payment is not made until the discount period has lapsed:

July 26	Cash	$100	
	Accounts Receivable		$100
	To record the collection of the gross amount; the lapsed sale discount revenue is left buried in the sales account		

If the accounting period ends before the payment is received but *after the discount has lapsed,* then *no* entry has to be made, since the receivable is already at gross and the revenue has been recognized. If the accounting period ends *before* *the discount period ends,* then an accounting entry must be made. The accounts receivable is overstated (stated at $100; it should be $98), and the revenues are overstated (sales were recorded at $100 but the customer only has to pay $98). An entry should be made for those discounts expected to be taken.

Dec. 31	Sales Discount	$2	
	Accounts Receivable:		
	Allowance for Sales Discounts		$2
	To reduce the accounts receivable by those sales discounts expected to be taken, and to reduce sales by an equal amount, using contra accounts in both cases		

If payment is received within the discount period on January 5, then there are various possible methods of recording the transaction. The easiest procedure is to record the transaction in the normal way, and then to adjust the allowance account at the end of the accounting period to conform with the outstanding sales discounts. Another acceptable alternative is to make the following journal entry:

Cash	$98	
Accounts Receivable: Allowance for Sales Discount	2	
Accounts Receivable		$100
To record the collection on January 5		

Management and Accounts Receivable. Accounts receivable are susceptible to theft as they are collected. A common method of theft is for the bookkeeper to fail to record the collection of cash from a customer and to take the cash for personal use. When payments are received from other customers, entries are made to the account of the first customer. Thus there is a lag in recording payments (this procedure is called *lapping*). Another popular method of theft is for the bookkeeper to make the following entry upon the receipt of cash from a customer:

Accounts Receivable: Allowance for Uncollectibles	xxxx	
Accounts Receivable		xxxx

By writing off the account, the customer's account may be credited and thus the accounting records are kept in balance. A variant of this procedure is to debit sales returns or sales allowances. The amount of undiscovered dishonesty can be kept to a minimum by:

1. The use of control and subsidiary accounts kept by different personnel.
2. The requirement that write-offs and sales returns must be approved by a high executive.
3. Requesting the customer to confirm account balances.
4. Various internal control devices.

Frequently the control of accounts receivable does not provide for the prevention of dishonesty, and correction of inefficiency is neglected. Just as idle cash balances cost money, excessively large balances of accounts receivable can also cost money because these accounts must be financed by the company which made the sale. It is up to management to install reporting devices that will indicate whether or not payments of accounts receivable are being promptly received. Among the tools available are aging schedules of accounts receivable, computation of turnover of receivables (credit sales for a year divided by the average receivable balance), and computation of the number of days' receivables on hand (divide the sales for the period by the number of the days in the period to obtain a sales-per-day figure; divide the accounts receivable balance by the sales per day to obtain the number of days' receivables on hand).

Another facet of controlling accounts receivable is the minimization of uncollectible accounts. The first step here is a sensible credit policy. The second step is to encourage prompt payment and to initiate follow-up action when payment is not forthcoming. It is interesting to note that one of the major problems of administering a hospital is the collection of bad accounts. This is related to the fact that, unlike an automobile dealer, the hospital cannot refuse service to a person who needs it and neither can it reclaim the service sold if collection is not forthcoming.

QUESTIONS AND PROBLEMS

11-1. The Early Company

The terms of all sales made on account are 2/10, n/30. The Early Company records sales, using the net price procedure. Record the following transactions in the general journal.

1. Sales of $123,458 are made on account (this is the gross figure) during the month of January.
2. Collections during the month were $98,800. This represented collections of $100,000 of accounts, gross.
3. At the end of the month an analysis of the accounts receivable reveals that, of the accounts still outstanding, discounts have already lapsed on $9,800 of accounts (net). There are $107,800 of accounts (net) which still have discounts outstanding.

11-2. The Eaton Company

Record the same transactions as those in Prob. 11-1, but use the gross price procedure for recording sales.

11-3. The Eddy Company

Record the following transactions, using the gross price procedure; the terms of the sales are 3/15, n/30:

Dec. 1	Sale on account to the Jones Company, $1,000 (gross price).
Dec. 20	The gross amount is received from the Jones Company.
Dec. 23	Sale on account to the Smith Company, $500 (gross price).

Dec. 31 Make any adjusting entries which are required.
Jan. 3 The net amount is received from the Smith Company.

11–4. The Eden Company

Record the same transactions as those in Prob. 11–3, but use the net price procedure.

11–5. The Edgeworth Company

The Edgeworth Company matches expected bad debts with the period in which the revenues were recognized. Past experience indicates that the uncollectible accounts are 1% of credit sales. At the beginning of 1957 the accounts receivable has a balance of $125,000, and the allowance for uncollectible accounts has a balance of $2,300.

Record the following transactions:

1. Total sales during the period were $503,000, of which $103,000 were cash sales.
2. Total collections of accounts receivable were $384,000. Of this amount $300 represented accounts which had been written off in the preceding period.
3. Accounts written off during the period were $2,050.
4. Set up the allowance for uncollectibles at the end of the period.

11–6. The Edward Company

The terms of all sales made on account are 2/10, n/30. Sales are recorded, using the net price procedure. The company uses a procedure which matches expected bad debts with the period in which the revenues are recognized. Past experience indicates that uncollectible accounts are 1% of credit sales (net price). At the beginning of the period the allowance for uncollectible accounts has a balance of $3,450. The allowance account is adjusted annually on December 31.

(a) Record the following transactions:

1. Sales on account of $10,000 (gross price).
2. Collection from customers, $500 (the net amount was $490 but the payment was made after the discount period had lapsed).
3. Collection of accounts receivable, $98.
4. It is decided that $4,540 of accounts receivable will not be collected; these accounts are written off.
5. The following collections are made of accounts written off:

Written off in this period	$150
Written off in a prior period	45
	$195

6. At the year's end the following summary information is made available:

Gross Sales on Account	$500,000 (already recorded)
Net Sales on Account	490,000 (already recorded)
Sales Discount Revenue	2,000 (already recorded)

Record

Adjustment necessary because of expected uncollectibles.

Adjustment necessary because the discounts have lapsed on $9,849 of receivables (net price).

Adjustments necessary because, as of December 31, there are $49,000 of accounts receivable on which the discounts have not lapsed. It is expected that 80% of these discounts will ultimately be taken.

(b) Record entry 6, assuming sales are recorded at gross.

11–7. The Egbert Corporation

The Egbert Corporation makes an adjustment at the year's end for estimated sales returns. Of the sales made in 1958 it is estimated that $10,000 of merchandise (sales price) will be returned. The merchandise cost of goods sold is approximately 75% of the sales price. Returned merchandise has to be sold to a wholesaler at a greatly reduced price; thus it is estimated that returned merchandise is worth only 60% of its original cost. Assume that cost of goods sold has been recorded for the period.

Required

(a) Record the entries necessary to take note of the above information.

(b) What would be the effect of not noting that some of the sales made in this period will be returned in the next period?

11–8. The Egbert Corporation (continued)

The Egbert Corporation follows a policy of recognizing bad debts in the period in which they occur and of making the following journal entry:

Bad Debt Expense	xxx	
Accounts Receivable		xxx

The controller claims that this procedure avoids the necessity for making subjective estimates of the accounts which are going to become bad in the future. He also states that it is silly to set up an allowance for uncollectibles and tie up assets in this unproductive manner.

Required: Comment on the procedure followed and the arguments of the controller.

11–9. The Eggwhite Company

Compute the allowance for uncollectibles which will be required as of December 31, 1958.

Accounts Receivable	*Age of Accounts*	*Probability of Collection, %*
$10,000	1 Mo. or Less	90
4,000	1 Mo. to 6 Mos.	80
2,000	6 Mos. to 2 Yr.	40
500	Over 2 Yr.	10

12

Current Liabilities and Purchases

THE LIABILITY FOR noncash purchases is usually recorded at the time the goods or services are received and before the payment is authorized. If the payment is to be made within a year, the liability is considered a current liability. Among the items most commonly found under the current liability classification are the following:

Accounts Payable
Wages Payable
Taxes Payable
Advances by Customers
Portion of Bonds Payable (due within 12 months)
Notes Payable (if due within 12 months)
Interest Payable
Dividends Payable

Accounts Payable and Purchases. Accounts payable is the account used to record the amount owed to trade creditors. The liability is usually recorded when the invoice is received from the supplier if the service or product purchased has been received (the invoice, receiving report, and purchase order should be compared to see that the order has been properly filled).

One of the most troublesome problems in recording accounts payable and purchases is the treatment of discounts which are offered for prompt payment. This problem has already been investigated from the point of view of the selling company. The purchasing company has an analogous problem. Should the purchases and the liability be recorded, using the gross or net price of the product? Companies are fairly well split between the two procedures; properly applied, both procedures give equivalent results. Unfortunately many companies improperly use the gross price procedure, with a resulting loss of significant information and also incorrect reporting.

Since the advantages of the net price procedure of recording purchases are simplicity and efficiency, it will be illustrated first. In appraising the entries, remember that the net price of the merchandise is the real cost, since that is all that has to be paid.

Illustration: The Net Price Procedure

Merchandise is purchased on December 15th for $100, terms 2/10, n/30. Make the entries, assuming it is (a) paid for on December 21, (b) paid for on December 30, (c) not paid for prior to December 31.

Dec. 15	Merchandise	$98	
	Accounts Payable		$ 98
	To record the purchase, using the net price procedure; the merchandise is recorded properly at $98		
21	Accounts Payable	98	
	Bank		98
	To record assumption (a), payment within the discount period		
30	Accounts Payable	98	
	Loss on Lapsed Purchase Discount	2	
	Bank		100
	To record assumption (b), payment after the discount has lapsed		
31	Loss on Lapsed Purchase Discount	2	
	Accounts Payable		2
	To record assumption (c), payment is not made prior to closing.		

Where the discount had lapsed, it was necessary to recognize the loss and increase the liability at the end of the accounting period.

If the period had ended and payment had not been made, but the discount had not lapsed, then no entry would be necessary on December 31, since the accounts payable is correctly stated at $98.

Gross Price Procedure. The foregoing situations will be repeated in this section in order to illustrate two different methods of recording purchases by using the gross purchase order price. One method will be complex but correct. The second procedure will be incorrect for several reasons.

	Correct Gross Price Procedure			*Incorrect Gross Price Procedure*
Dec. 15	Merchandise	$100		Same
	Accounts Payable		$100	
	To record the purchase, using the gross price procedure; the merchandise is temporarily overstated by $2, as is the accounts payable			

21	Accounts Payable	100		Same		
	Purchase Discount		2			
	Bank		98			
	To record the payment within the discount period; the purchase discount account is a contra to the merchandise account and reduces the merchandise to the net amount					
30	Accounts Payable	100		Accounts Payable	$100	
	Loss on Lapsed Purchase Discount	2		Bank ...		$100
	Bank		100			
	Purchase Discount		2			
	To record the payment after the discount has lapsed; the incorrect procedure fails to record the lapsed discount or to reduce the merchandise to its real cost, $98					
31	Loss on Lapsed Purchase Discount	2		No entry		
	Purchase Discount		2			
	Assuming the payment is not made prior to closing; to record the lapsing of the discount and the reduction of the merchandise to net price; the second procedure incorrectly makes no entry					

If the purchase had been made on December 28, and the period had ended before payment was made (or discount lapsed), then the following entry would be made:

Dec. 21	Accounts Payable: Allowance for Purchase Discounts	$2		No entry
	Purchase Discount		$2	
	To reduce the accounts payable and merchandise to net price, the true liability, and the true cost of merchandise; the second procedure incorrectly makes no entry			

The account "Purchase Discount" is frequently incorrectly interpreted. It is a contra account to the merchandise or purchases account. *The true cost of the merchandise is $98, the net price, since that is all the purchasing firm has to pay.* If they pay more than the net price, the additional amount is a cost of inefficiency and *not a cost of merchandise.* Actually few firms can afford to lose many purchase discounts, since they are in effect paying approximately 36% for the use of the funds, assuming terms of 2/10, n/30.

Computation of Equivalent Rate of Interest. If payment is not made during the first 10 days, the firm has the use of the funds for 20 days more (the total amount has to be paid by 30 days). Thus 2% is being paid for the use of funds for 20 days, or an annual rate of interest of $2\% \times {}^{360}/_{20} = 36\%$. The actual interest may be more or less than 36%, depending on the exact date of payment.

The 36% computed here makes it obvious that the firm which fails to take advantage of purchase discounts is actually paying a penalty and not paying interest (except for a small fraction of the total) or paying for merchandise.

The incorrect gross price procedure illustrated is faulty because it only reduces the merchandise to net price (the true cost) when and if the discount is taken. If the discount has lapsed or has not been taken as yet, then no entry is made. The inefficiency causing the discount to lapse is also hidden. Finally, the accounts payable is overstated if the adjusting entry is not made to reduce it to net price for the discounts still outstanding at the end of the accounting period.

The gross price procedure, in one form or another, is the most widely used procedure for recording purchases. The primary justification for using the procedure is that it avoids the clerical effort of computing units costs for inventory purposes, a necessary operation if they are only stated at gross prices on the invoice.

Wages and Wages Payable. The primary problem in recording wage costs and wages payable centers around the handling of the fringe benefits that accrue to the worker. If these benefits are taken out of the employees' total wages, the classification problem is relatively simple, since it is merely a question of changing from one liability, "wages payable," to several more specific liabilities such as: FICA[1] (Social Security) Payable, Income Tax Witholdings Payable, Union Dues Payable, Savings Bonds (of employees) Payable, Health Insurance Payable, Pension Plan Payable. There are other items that are also deducted, but the mentioned items illustrate the need for classification of the liabilities that arise from incurring labor costs.

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[1] FICA refers to Federal Insurance Contributions Act.

If any of the fringe benefits are partially or completely paid by the employer, the debit may be made either to a cost account describing the specific nature of the charge (for example, "Pension Plan") or to a labor cost account, so as to show the general nature of the cost (for example, "Manufacturing Labor"). A compromise procedure would first show the costs by their specific nature, and then transfer them to a labor cost account. Some accounting systems can record all this information simultaneously through the use of accounting machines.

Example

From the following information record the payroll for May:

MANUFACTURING LABOR PAYROLL DISTRIBUTION SUMMARY

	Gross Payroll	Income Tax Withheld	FICA Withheld	Union Dues	Net Payroll
J. Able	$ 500	$ 80	$ 10	$ 5	$ 405
F. Due	200	20	4	5	171
Etal	10,000	2,000	200	100	7,700
Total	$10,700	$2,100	$214	$110	$8,276

Additional Information: The company matches the employees FICA contribution, pays 2.7% of the gross payroll to the state for unemployment taxes, 0.3% in federal unemployment taxes, and contributes an amount equal to 10% of the gross payroll to a pension fund.

Journal Entries

Manufacturing Labor Cost	$10,700.00	
FICA Taxes Payable		$ 214.00
Income Tax Withholding Payable		2,100.00
Union Dues Payable		110.00
Payroll (wages payable)		8,276.00
To record the amount due the workers and the various withholdings		
Employer's FICA Tax	214.00	
Federal Unemployment Tax	32.10	
State Unemployment Tax	288.90	
Pension Costs	1,070.00	
FICA Taxes Payable		214.00
Federal Unemployment Tax Payable ...		32.10
State Unemployment Tax Payable		288.90
Pension Payable		1,070.00
To record the fringe benefits paid for directly by the employer		

Manufacturing Labor Cost	1,605.00	
Employer's FICA Tax, Applied		214.00
Federal Unemployment Tax, Applied		32.10
State Unemployment Tax, Applied		288.90
Pension Costs, Applied		1,070.00
To transfer the fringe benefit costs to manufacturing labor cost		

The use of contra accounts (the "applied" accounts) to transfer the fringe benefits is a useful device designed to retain the original information and at the same time to accomplish the transfer. For example, the total employer's FICA tax for the year may be obtained at any time by going to the employer's FICA tax account. If the credit had been made directly to the employer's FICA tax account instead of a contra account, the balance would have been zero. The *total* of the main account and contra account (the applied account) should be zero after the entry has been made to transfer the cost to the manufacturing labor cost account. The device of using two accounts to record information which could go into one, except for the consideration given previously, is exceedingly useful.

Taxes Payable. In recent years the largest tax liability has generally been federal income taxes payable, a result of high income tax rates and generally profitable operations. At the time the accounting records are closed, the actual income tax to be paid is merely an estimate, since the internal revenue service must first approve the company's report before the tax as computed becomes a definite liability. Despite this complication it is reasonable to set up the tax liability, using the most likely amount to be paid.

Advances by Customers. When a customer makes a payment in advance of the service to be performed, this creates a liability on the part of the company receiving the payment. The journal entry made at the time of receipt of payment may be:

Cash	xxxx	
Accounts Receivable		xxxx
To record a payment from a customer in advance of service		

A *credit balance* in the accounts receivable account would signify that the amount was actually a liability. If this type of transaction frequently occurs, then the credit should be made to a definite liability account so that the confusion arising from crediting accounts receivable to increase a liability may be avoided. For example, a magazine company selling 2 year subscriptions would make the following entry:

July	1	Cash	$24	
		Customer Subscriptions		$24
		To record the receipt of $24 to pay for the subscription		

	for the next 24 months; customer subscriptions is a liability account		
Dec. 31	Customer Subscriptions	6	
	Magazine Revenue		6
	To recognize the revenue accruing for 6 months and the corresponding decrease in the liability		

At the time of receipt of cash (July 1), revenue was not recognized, since the service had not yet been performed (preparation and shipment of the magazines). At the end of the accounting period (December 31) it is recognized that some magazine revenue has been earned and that the liability has decreased.

Interest, Bonds, and Notes Payable. Interest and interest-bearing debts are treated in detail in Chapter 16; therefore, the discussion will be limited here to the specific problem of determining when these items are considered current liabilities.

Interest is considered a liability as it accrues. Thus, even though the payment of interest is almost a certainty for the coming year, the interest liability would not be recognized at the beginning of the accounting period. It would be recognized when the debt was paid or at the end of the accounting period. This procedure agrees with the handling of other costs and liabilities.

Bonds payable are found in the long term liability section of a position statement; however, if a portion of the bonds come due in 12 months or less, then this portion should be shown as a short term liability.

Whether notes payable are short or long term liabilities depends entirely on their maturity date. If they come due after 12 months, they should not be classified as current assets. Suppose a large note is to come due in 13 months. How should this be treated? This is a matter of judgment, since the 12-month rule is a guide, not a straight jacket.

Dividends Payable. When dividends on stock are declared, they become a liability of the corporation. The entry to be made at the time of declaration is:

Dividends	$1,000	
Dividends Payable		$1,000
To record the declaration of a dividend; the debit is to a distribution of income account		
Dividends Payable	1,000	
Bank		1,000
To record the *payment* of the dividend		

Income Summary	1,000	
Dividends		1,000
To close the dividends account		

Dividends on stock should be distinguished from *stock dividends.* The dividends on stock are actually accompanied by a disbursement of cash. Stock dividends are dividends which take the form of issuance of more shares of stock instead of disbursements of cash. The declaration of stock dividends, unlike dividends on stock, does not give rise to a current liability. All that is being done in the former case is to declare a "capitalization" of retained earnings. This has legal meaning, and thus it has to be recorded by the accountant. The entry would be:

Retained Earnings	xxxxx	
Capital Received from Stockholders		xxxxx
To record a stock dividend		

Materiality and Accounting Practice. The first chapter listed "materiality" as one of the guiding rules of accounting practice. In the subsequent chapters there were situations where the accounting practice did not coincide with accounting theory. Among the transactions were the treatment of credit balances in accounts receivable (the liability was allowed to reduce the asset), direct write-off of bad debts (instead of establishing an allowance for uncollectibles), and using a gross price method of recording purchases (which buries the loss on lapsed purchase discount). In many situations these treatments are allowable because the variation caused by the practice is not material. The criterion of materiality is a relevant consideration, but it should not be used to justify faulty accounting.

From a managerial point of view the type of accounting problem discussed here is not generally significant, but there are important exceptions. Thus a gross price procedure for recording purchases may be used to bury the loss on lapsed discounts. The amount of purchase discounts which are allowed to lapse is control information and should not be buried in an inventory account. Items that are not material from a general accounting point of view may be material from the point of view of management's concern for the control of costs.

QUESTIONS AND PROBLEMS

12–1. The Faraday Company

The Faraday Company records purchases by using the net price procedure. Record the following transactions. Amounts stated are gross prices.

Dec. 1	Purchase of $1,000 of merchandise; terms 2/10, n/30.
Dec. 3	Purchase of $500 of merchandise; terms 3/15, n/45.
Dec. 15	Purchase of $200 of merchandise; terms 3/10, 2/20, n/45.

Dec. 16 Payment of $1,000 to pay for merchandise purchased on December 1.
Dec. 17 Payment of net price to pay for merchandise purchased on December 3.
Dec. 18 Purchase of $100 of merchandise; terms 2/10, n/30.
Dec. 28 Payment of $196 to pay for merchandise purchased on December 15.
Dec. 29 Purchase of $600 of merchandise; terms 2/10, n/30.
Dec. 31 The books are closed on this date. Make any adjusting entries required.

12–2. The Farmer Company

Record the transactions of Prob. 12–1, using the *correct* gross price procedure. Repeat, using the incorrect gross price procedure, and point out the differences.

12–3. The Falkner Corporation

The following information applies to December 31, 1958.

Accounts Payable per books (net price procedure)	$35,000
Purchase discounts which have lapsed (they have not yet been recorded)	200
Purchase discounts which are still outstanding	300

Required

(a) Record any adjusting entries required on December 31, 1958.

(b) Assume that the company had used a gross price procedure to record purchases and that accounts payable were recorded at $35,500, the gross amount. Record any adjusting entries required on December 31, 1958.

12–4. The Farrell Corporation and the Ferber Corporation

The Farrell Corporation regularly sells to the Ferber Corporation. The terms of sale are 2/10, n/30. During December the following three sales are made:

	Gross Price
Dec. 10	$20,000
Dec. 16	10,000
Dec. 28	30,000

On December 19 the Farrell Corporation is paid $19,600. As of the year's end, the other two bills are unpaid. The gross amounts of these two bills are finally paid on January 15 of the next year.

Required

(a) Record the transactions of December and January on the books of the Ferber Corporation, including the adjusting entries required at year's end, assuming the company uses a net price procedure.

(b) Repeat part (a), using a gross price procedure.

(c) Record the transactions of December and January on the books of the Farrell Corporation, including the adjusting entries required at year's end, assuming the company uses a net price procedure.

(d) Repeat part (c), using a gross price procedure.

12–5. The payroll distribution summary sheet of the Field Company has columns which totaled as follows for the week ending May 27.

Gross Payroll	$100,000
Income Tax Withheld	12,000
FICA Withheld	2,500
Union Dues	200
Savings Bonds	7,000
Blue Cross	2,000
Life Insurance	1,300
Net Payroll	75,000

The labor cost distribution showed that the nature of the labor incurred was:

Direct Manufacturing Labor	$60,000
Indirect Manufacturing Labor	40,000

The company matches the employees FICA contribution, pays 2.7% of the gross payroll to the state for unemployment taxes, 0.3% to the federal government for unemployment taxes, and contributes 10% of the gross payroll to a pension fund for employees. These fringe benefits are treated as indirect labor costs, but they are first recorded so as to identify their specific nature.

Required: Record the labor costs and payroll for the week of May 27.

12–6. Record in journal form the following transactions:
Dec. 15 Declaration of a dividend of $2 per share of common stock (there are 10,000 shares outstanding).
Dec. 31 The accounts are closed.
Jan. 20 The dividend is paid.

12–7. Record in journal form the following transactions:
Jan. 27 Sale of merchandise to the XYZ Company $3,000.
Jan. 30 The XYZ Company makes payment of $3,000.
Feb. 4 The merchandise sold on January 27 to the XYZ Company is returned because it failed to meet specifications. The returned merchandise has decreased $500 in value. The company uses a periodic inventory procedure and closes its books quarterly.

12–8. The Fisk Corporation
Dec. 1 Purchase of $10,000 of merchandise from the ABC Company.
Dec. 15 The merchandise purchased on December 1 is paid for.
Dec. 22 The merchandise purchased on December 1 is returned to the ABC Company. The following entry is made:

Accounts Payable	$10,000	
Merchandise		$10,000

Required: Assuming that the accounts payable account has a balance of $90,000 and that the only creditors account with a debit balance is the ABC Company, how much does the Fisk Company owe to its trade creditors? Explain.

12–9. The Overland Railroad Company

The Overland Railroad Company sells commuters' tickets which are good for 12 months from time of purchase. The entry made at time of the sales of the tickets is as follows:

Cash	xxxxx	
Revenues, Commuters Tickets		xxxxx

At the end of the accounting period the account "Revenues, Commuters Tickets" is closed out to the expense and revenue summary.

Required

(a) Comment on the procedure followed in the recording of the above transactions.
(b) In general, when should revenues be recognized?

12–10. The Overland Railroad Company (continued)

The company has $10,000,000 of 6% bonds outstanding. At the beginning of each year the following entry is made to accrue interest:

Interest Charges	$600,000	
Interest Payable		$600,000

The company issues quarterly reports as well as an annual report of income and financial position.

Required: Comment on the procedure followed for recording interest.

13

Depreciation

DEPRECIATION ACCOUNTING IS generally defined as a systematic procedure for allocating the cost of a long-lived asset over its useful life. The depreciation cost measures that portion of the original cost of the capital asset which is assigned as either a cost of production or an expense of obtaining the revenues of the period.

There are various points of confusion arising because of the characteristics and treatment of depreciation. The accompanying table attempts to highlight some of the more common errors.

	Common Statement Relative to Depreciation	*Correct Statement*
1.	Depreciation fails to consider the factor of obsolescence.	The useful life of the asset takes into consideration the rate of obsolescence as well as the rate of physical deterioration.
2.	The reserve (or allowance) for depreciation is a reservoir of cash resources.	The reserve (or allowance) for depreciation is merely an asset valuation account.
3.	The primary function of depreciation is to provide for replacement of the asset.	The primary function of depreciation is to spread the cost of the asset over its useful life.
4.	Depreciation is a source of funds.	Funds are generated by sales, not by accruing depreciation.

The points of confusion contained in the table by no means exhaust the list. There are many more common misinterpretations. Most of the points of confusion arise because of ignorance of the discussants as to the basic nature and theory of depreciation, particularly the significance of the accounting entries. The subsequent sections attempt to lay a foundation of knowledge which will minimize the possibility of these errors becoming accepted as truths.

Accounting Entries. The accounting entries for the recognition of depreciation are simple, but they are often misunderstood. In order to understand the entries which are conventionally made, it is necessary to review their purpose. We are attempting to allocate the cost of an asset over its useful life and to measure the cost of using the asset in each accounting period. Thus a cost account must be increased (by debiting it) and an asset account decreased (by crediting it).

Example

A building is purchased on January 1 for $10,000. It has an expected useful life of ten years. Assume that depreciation should be charged equally to each year the asset is used.

Jan. 1	Building	$10,000	
	Bank		$10,000
	To record the purchase of the building		
Dec. 31	Depreciation Cost	1,000	
	Building		1,000
	To record the depreciation cost for the year and the decrease in value of the building		

The above entries represent sound treatment of depreciation, but note that the building account will have a balance of $9,000 after the $1,000 has been credited to the account. The original cost of the fixed asset is no longer directly recorded. This procedure overlooks a bit of relevant information. A reader of financial reports may want to know how much was paid for the assets and to what extent they have been depreciated. This information cannot be readily obtained if the foregoing procedure is followed. Thus the accountant does not credit the building account, as was done in the example, but rather credits a contra to the building account (an account which is a subtraction from the building account). This contra account has various titles. Among the most popular are "Allowance for Depreciation," "Accumulated Depreciation," and "Reserve for Depreciation." The entry made on December 31 to accrue the depreciation cost and the decrease in value of the building would then be:

Depreciation Cost	$1,000	
Building, Allowance for Depreciation		$1,000

This is the generally accepted entry for accruing depreciation. The credit is not made directly to the fixed asset account but to a contra asset account.

It should be recognized that the balance in this contra account, no matter what its title, is merely *a subtraction from the fixed asset account. It is a valuation account and nothing more.* There are innumerable instances where the nature of this account has been misinterpreted. Economists have blamed depressions on it, stockholders have accused management of hiding excess cash here, and even supreme court judges have fallen victim to the misunderstandings arising from the failure of the accounting profession to find an expression to describe exactly what this collection of credits represents. Part of the blame must be placed on the use of the title "Reserve for Depreciation." The term *reserve* carries a connotation of cash being actually set aside. This is, of course, misleading. The account title "Accumulated Depreciation" is fine, although it might be confused with the depreciation cost account. The titles "Allowance for Depreciation" and "Accumulated Depreciation" will be used in this text, not because they answer all difficulties, but because they are currently acceptable by the accounting profession and are somewhat less confusing than other possible terms.

Position Statement Presentation. The allowance for depreciation should appear on the position statement as a subtraction from the fixed asset account. Thus after the first year the position statement of the company in the preceding example would contain the following item:

Building	$10,000	
Less:		
Allowance for Depreciation	1,000	
Building Less Depreciation		$9,000

An alternative presentation would be:

Building	$10,000	
Less:		
Accumulated Depreciation to Date	1,000	
Building Less Depreciation		$9,000

Some firms show only the $9,000, with a footnote explaining the detail. Any of these treatments is acceptable. The mistake that should be avoided is the placing of the allowance for depreciation account on the equity side of the position statement merely because it has a credit balance, as do the other items on the equity side. There is no justification for treating the allowance for depreciation in this manner. It is clearly a subtraction from an asset account and should be shown as such on the position statement.

The Depreciation Base. The base for the computation of depreciation is the cost of the asset adjusted for salvage which may be received at the time of retirement. If there are any removal costs that are expected to be incurred at time of retirement, these should also be taken into consideration when computing the annual depreciation.

Example

Establish the bases for the computation of depreciation, given the following facts:

(a) A building is purchased for $10,000. The forecasted salvage is $500 and the forecasted removal cost is $200.

(b) Equipment is purchased for $9,000. The forecasted salvage is $400 and the forecasted removal cost is $600.

Answer to (a)

Cost of Building		$10,000
Salvage	$500	
Removal Cost	200	
Net Salvage		−300
Base for Depreciation Computation		$ 9,700

Answer to (b)

Cost of Equipment		$ 9,000
Removal Cost	$600	
Salvage	400	
Net Removal Cost		200
Base for Depreciation Computation		$ 9,200

In example (b) the depreciation base is greater than the cost of the asset.

Methods of Computing Depreciation. The objective of depreciation accounting is to assign systematically to expense the cost of a fixed asset over its useful life. There are, however, many methods of accomplishing this task. The reader does not have to decide which of these procedures is correct, but he should be familiar with the methods of computing the various procedures and should also appreciate some of their limitations and strong points.

Straight-Line Procedure. When using the straight-line procedure for computing depreciation, the annual depreciation charge is obtained by dividing the depreciable base (cost plus removal cost less salvage) by the number of years of useful life forecasted. A *rate of depreciation* may be obtained by dividing the number of years of life into one (thus obtaining the reciprocal of the number of years).

Example

A building is purchased for $10,000. The forecasted salvage is $456 and the forecasted removal cost is $200. The expected *useful* life of the building is 4 years. Compute the annual depreciation charge and the rate of depreciation, using the straight-line procedure. (These figures will also be used for other methods discussed in subsequent text).

$$\text{Annual depreciation} = \frac{\$10{,}000 - \$456 + \$200}{4} = \frac{\$9{,}744}{4} = \$2{,}436$$

Alternative Computation:

$$\text{Rate of depreciation} = \frac{1}{4} = .25 \text{ per year}$$

$$\text{Annual depreciation} = \$9{,}744 \times .25 = \$2{,}436$$

The main advantages of the straight-line procedure are its simplicity and the fact that revenues of successive years are charged with equal amounts of depreciation. The main disadvantage is that, given the assumptions of constant revenue and constant maintenance costs, the return on investment of the asset will increase as the asset becomes older and the net book value decreases.

Decreasing Charge Methods. Decreasing charge methods of computing depreciation rise and fall in popularity, depending on the income tax laws. If the tax law allows any of the various decreasing charge methods, then a firm will generally benefit by taking as much depreciation as possible in the early years of the asset. The method of accounting for tax purposes has a tendency also to influence the financial accounting; thus the decreasing charge methods are also found in financial reports.

The one common characteristic of all decreasing charge methods of accruing depreciation is that the depreciation in the beginning years is greater than the depreciation in the later years. Three methods most commonly used are:

1. Twice Straight-Line, Declining Balance
2. Sum of the Years' Digits
3. Formula, Declining Balance

Each of the three procedures will be illustrated, using the same figures as those used to illustrate the straight-line procedure.

Example 1. Twice Straight-Line, Declining Balance

The straight line depreciation rate was 25%; thus twice this rate is 50%. This rate is not applied to the depreciable base as computed for straight line but to the cost, $10,000. This procedure is followed because of the "tail" which develops when a constant rate of depreciation is applied to a "declining balance." The depreciation for each of the 4 years will be as follows:

Year	Depreciable Base	Rate	Depreciation Cost	Total Accrued Depreciation
1	$10,000	50%	$5,000	$5,000
2	5,000	50%	2,500	7,500
3	2,500	50%	1,250	8,750
4	1,250	50%	625	9,375

At the end of the 4 years the total depreciation is $9,375, which is less than the amount accrued when using straight-line depreciation ($9,744).

Example 2. Sum of the Years' Digits

This is a mechanical contrived procedure that succeeds in giving a decreasing depreciation charge. First the "number of years" is totaled. For example:

$$\begin{array}{r} 1 \\ 2 \\ 3 \\ 4 \\ \hline 10 \\ \hline\hline \end{array}$$

The first year's depreciation rate will be the number of the last year divided by the sum of the years. Thus, this depreciation rate will be 40% in the problem being studied. This rate will be applied to the depreciable base, $9,744. The depreciation for each of the 4 years will be as follows:

Year	Depreciable Base	Rate	Depreciation Cost	Total Accrued Depreciation
1	$9,744	40%	$3,897.60	$3,897.60
2	9,744	30%	2,923.20	6,820.80
3	9,744	20%	1,948.80	8,769.60
4	9,744	10%	974.40	9,744.00

Example 3. Formula, Decreasing Balance

The formula used is $r = 1 - \sqrt[n]{\frac{s}{c}}$

where n = the number of years.

s = the net salvage (this must be a significant amount or the answers will be absurd, since the depreciation rate approaches *one*).

c = the cost of the asset

r = the rate of depreciation to be applied to the cost and then to a declining balance.

For example:

$$r = 1 - \sqrt[4]{\frac{\$256}{\$10{,}000}} = 1 - \frac{4}{10} = .6 \text{ or } 60\%$$

The depreciation for each of the four years would be as follows:

Year	Depreciation Base	Rate	Depreciation Cost	Total Accrued Depreciation
1	$10,000	60%	$6,000	$6,000
2	4,000	60%	2,400	8,400
3	1,600	60%	960	9,360
4	640	60%	384	9,744

The formula procedure will *not* usually give the same results as the twice straight-line procedure because the depreciation *rate*, using the twice straight-line procedure, fails to take into consideration the net salvage. The formula method does take it into consideration.

The use of the decreasing charge procedures may be justified if the shape of the earning curve of the asset being analyzed is such that the revenues of the first years of life are greater than the later years. If the revenues decrease as the asset ages, it is reasonable to burden the earlier years with more depreciation cost. If the asset does not have these earning characteristics, then the use of a decreasing charge procedure will result in understated earnings and earning rates in the early years, overstated earnings, and overstated returns on investment in the later years.

Depreciation and Activity. Up to this point depreciation has been considered to be a function of time. The depreciation occurred because of the passage of time. There are some types of fixed assets whose lives are more a function of activity (use) than of time. An example of a fixed asset of this type is an airplane engine. The life of the engine may well be a function of flight hours rather than age. The rate of obsolescence tends to determine whether the depreciation accrual should be based on activity or time.

Example

An airplane engine which cost $5,000 has a life of 10,000 hours of flying time. What is the first year's depreciation, if the plane is flown a total of 2,000 hours?

Answer: The rate of depreciation is $0.50 per hour of flying time. The depreciation for 2,000 hours would be $1,000.

If the engine were flown only 500 hours, and if the expected useful life were only five years (because of technological change), what would be the depreciation charge for the year?

Answer: On an activity basis the depreciation would be

$$\$0.50 \times 500 = \$250$$

but the useful life of the asset is only five years; thus the minimum depreciation on a straight-line basis would be

$$\frac{\$5,000}{5} = \$1,000$$

The depreciation cost for the year should be $1,000. If there is reason to suspect the usage of the engine in the next 4 years to be more than 2,000 hours per year, there may be justification for considering the depreciation to be $250.

Expected Useful Life. The life of a fixed asset is not only a function of the physical wear and tear to which it is subjected, but also of the technological change going on around it. Thus, if the fixed asset is expected to have a physical life of 10 years, but to become obsolete in 4 years, the depreciation charge per year should be based on a life of 4 years.

Adjustment of Useful Life. After an asset has been depreciated for a period of years, it may become obvious that the original estimate of service life was incorrect. There are two reasonable alternatives: (1) depreciate the remaining book value over the remaining service life; (2) adjust the allowance for depreciation to agree with the revised estimate of the situation, and then depreciate the asset over its remaining life, using the new rate of depreciation. The latter alternative would seem to be the sounder of the two. Any adjustments should, of course, be clearly disclosed. The accountant should be aware of the fact that although it is wise to adjust past mistakes, it is unwise to allow a situation to develop which will someday in the future require an adjustment. Accounting should be a tool for management, not a means of manipulation.

Example of Adjustment of Useful Life

A building was purchased on January 1, 1946, at a cost of $100,000. It was estimated that the asset would have a life of 40 years. On December 31, 1956, it was decided that, because of changing economic conditions, the life of the building would be 20 years.

Compute the adjustment of depreciation, the new rate of depreciation, and the annual depreciation for 1956. What are the necessary journal entries?

Solution: Based on the original estimate, after 10 years (January 1, 1946, to December 31, 1955) the allowance for depreciation had a balance of $25,000 (one-fourth of the cost), but according to the revised life, the allowance should have been $50,000. Thus the adjustment to the allowance should be $25,000. Since the new rate of depreciation is based on a life of 20 years, the annual rate is 5%, or $5,000 per year. Therefore the annual depreciation for 1956 is $5,000.

Adjustment to Depreciation of Prior Years	$25,000	
Building, Allowance for Depreciation		$25,000
To adjust the allowance for depreciation based on a life of 20 years		
Depreciation Cost	5,000	
Building, Allowance for Depreciation		5,000
To accrue the depreciation of the building for 1956		

The "T" accounts are also of assistance in visualizing this adjustment.

Building

√ $100,000	

Adjustment to Depreciation of Prior Years

(1) $25,000	

Building, Allowance for Depreciation

	√ $25,000
	(1) 25,000
	(2) 5,000

Depreciation Cost

(2) $5,000	

Group or Unit Depreciation. When the depreciation is computed for each individual asset, a "unit" procedure is being followed. For some purposes the group procedure of accruing depreciation is easier to apply. When following this procedure, no attempt is made to depreciate the individual assets, but rather an entire group is treated as a unit. This procedure is especially applicable to a large homogeneous mass of long-lived assets purchased at approximately the same time. An average life is the basis for determining the rate of depreciation to be used. The rate of depreciation is the reciprocal of the average life. To compute the depreciation for the year, this rate is commonly applied to the beginning of the year's balance of the fixed asset account. However, other procedures are equally acceptable.

The group procedure differs most drastically from the unit procedure when an asset is retired. When one of the original group is retired, *no loss on retirement is recognized.* The loss on retirement is recognized when the last unit of the group is retired, although it is possible to recognize that the original average life estimate was faulty and then to adjust the allowance for depreciation prior to that time.

QUESTIONS AND PROBLEMS

13–1. A building which cost $100,000 is completed on January 1, 1955. It has an estimated useful life of 20 years. The estimated salvage at the time of retirement is $10,000. The company uses a straight-line procedure for computing depreciation.

Required

(a) Prepare journal entries to record the depreciation cost of 1955 and 1956.

(b) What is the book value of the building as of December 31, 1955? 1956?

(c) Show three possible presentations of "building" on the December 31, 1956, position statement.

(d) What factors should be taken into consideration in determining the

13–2. A piece of equipment which cost $100,000 has an expected life of 5 years and a forecasted net salvage value at retirement of $1,024. It is purchased on January 1. The fifth root of $1,024 is $4, i.e., $\sqrt[5]{1{,}024} = 4$.

Required

(a) Complete the following table, showing the depreciation for each one of the 5 years of the life of the asset and the total depreciation accrued.

	Method of Depreciation			
Year	Straight-Line	Twice Straight-Line	Sum of the Years' Digits	Formula
1	$ 19,795.20	$ 40,000	$ 32,992.00	$ 6
2	19,795.20	24,000	26,393.60	2
3	19,795.20	14,400	19,795.20	
4	19,795.20	8,640	13,196.80	
5	19,795.20	5,184	6,598.40	
Total	98,976.00	92,224	98,976.00	9

(b) Under what conditions would a decreasing charge method of computing depreciation be reasonable?

13–3. Adjustment of the accumulated depreciation account will often bring into use an account "Adjustment to Depreciation of Prior Years." This account may have a debit or credit balance. Where should it appear on the income statement? Explain.

13–4. The Active Machine Company computes depreciation of equipment based on hours of usage of its equipment. A piece of equipment which cost $10,000 is purchased on January 1, 1957. It has an estimated useful life of 20,000 hours. During 1957 the machine was used a total of 2,000 hours.

Required

(a) Compute the depreciation for 1957. Prepare the journal entry.

(b) An analysis of past experience and future expectations indicate that equipment of this type can expect to become obsolete in five years. Does this additional information alter the reasonableness of the computation in part (a)? Explain.

13–5. Equipment was purchased on January 1, 1951 at a cost of $10,000. It was estimated that the asset had a life of 20 years. On December 31, 1956 it was decided that because of changing economic conditions the life of the equipment would be 10 years.

Required: Compute the adjustment of depreciation, the new rate of depreciation, and the annual depreciation for 1956. Give the necessary journal entries to be made on December 31, 1956.

13–6. The president of the Federal Company was somewhat confused by accounting terminology. He recently read in a financial journal that companies were financing their capital expenditures by using depreciation allowances and retained earnings. An inspection of the most recent position statement revealed that depreciation allowances were $20,000,000 and retained earnings were $40,000,000. This information added to his confusion, since his treasurer had recently informed him of the desirability of postponing capital expenditures because of financial considerations.

Required: Prepare a brief report which will clarify the terminology. Explain why financial analysts often speak of capital expenditures being financed from depreciation allowances. Are they correct?

13–7. The Gas Utility Company purchased 1,000 gas meters at a cost of $30 per meter. Rather than compute the depreciation and loss on retirement of individual units, the company has decided to use a group procedure for accruing depreciation and retiring meters. The specific procedure followed by the Gas Utility Company is to compute the depreciation based on the number of units in use as of January 1 of the year in question.

The *average* life of this type of meter has been estimated at 20 years. This means that the depreciation should be 1/20, or 5% of the cost of the meters in use at the beginning of the year.

Required

(a) Use "T" accounts to record the below information:
   1. The purchase of the meters on January 1, 1956
   2. The accrual of depreciation for 1956
   3. The retirement of two meters on July 15, 1957
   4. The accrual of depreciation for 1957
   5. The retirement of three meters on October 30, 1958
   6. The accrual of depreciation for 1958

(b) Would you expect any of the meters to be in use in the years after 1976? Explain.

(c) Is it possible for the "Allowance for Depreciation" to have a balance greater than $30,000? Explain.

13–8. A building is purchased on July 1, 1956 for $200,000. The building has an estimated life of 20 years. The purchase price of the building includes a combined heating and air conditioning system. The system has an estimated life of 10 years. It is estimated that the entire heating and air conditioning system cost $50,000, but that $20,000 of the cost could be used for any heating or air conditioning system installed (ducts and registers).

Required

(a) Record the purchase of the building.

(b) Record the depreciation for 1956.

(c) Record the depreciation for 1957.

14

Noncurrent Assets

NONCURRENT OR LONG-LIVED assets may be classified as tangible and intangible, and then subclassified as assets with terminable lives and assets with lives which do not have an apparent end.

- Tangible Assets: Terminable Life
  - Buildings
  - Equipment
  - Improvements to Property
  - Certain Natural Resources
- Tangible Assets: Interminable Life
  - Land
- Intangible Assets: Terminable Life
  - Patents, Leaseholds, Copyrights
- Intangible Assets: Interminable Life
  - Goodwill (may be terminable)
  - Organization Costs (sometimes classified as a tangible asset)

Tangible Assets: Terminable Life. What costs are to be considered as costs of the long-lived asset when it is purchased? One problem is the treatment of purchase discounts. These should be treated in exactly the same manner as when merchandise is purchased. The net price is the significant amount, and if the discount is not taken, the amount paid in excess of net price should be considered a penalty for inefficiency. Considered as a cost of the asset are the freight-in charges associated with the purchase and the installation costs. Suppose machine A is being replaced by machine B; should the cost of removing machine A be considered a cost of installing machine B? If the old machine has been used in operations, the removal cost would be considered as affecting the loss or gain on retirement of the old machine. If the old machine has not been used (for example, a plant was purchased with the old machine installed), then the removal cost would be considered as a cost of the building, since if the building were new, this cost would not have been incurred. The cost of removing the old machine in this latter case should have been known when the plant was purchased. It was not a cost of past operations, since the company had not previously operated the plant. Thus the cost of preparing the plant for operations should be considered a cost of the plant (building).

All tangible assets of terminable life have the common requirement for a system of amortizing their cost over their useful lives. Thus buildings and equipment are depreciated, natural resources are depleted, and leaseholds are amortized over their useful lives. The credits for depreciation and depletion accruals are usually made to contra asset accounts.

Example: Depletion of Natural Resources

The Baker Company has paid $100,000 to purchase and develop coal resources. It is estimated that there are 200,000 tons of coal on the property. In the first period 20,000 tons are mined.

Assume that the $100,000 has been debited to an account called "Coal Resources." Prepare journal entries to record the depletion for the period.

Depletion Cost	$10,000	
Coal, Allowance for Depletion		$10,000
To record the depletion based on $0.50 per ton, i.e., $\frac{\$100{,}000}{200{,}000}$ times the 20,000 of tons mined		

Instead of crediting a contra asset account, it would be possible to credit the main account directly.

Depletion Cost	$10,000	
Coal Resources		$10,000
To record the depletion directly to the coal resource account		

The only advantage of using the contra account is to retain the original cost information. This is of limited use because the value of coal resources is related to the amount of coal in the ground, not the cost of the asset.

For income tax purposes depletion may be computed without reference to the cost of the asset being depleted. This factor should not affect the financial accounting for depletion.

Retiring Depreciable Assets. If a building or equipment is retired, it is helpful to use a "suspense" account to record the various transactions which will affect the ultimate loss or gain. This suspense account is used because the gain or loss cannot always be determined at the moment of retirement.

Debit entries to the suspense account tend to decrease the stockholders' equity and are similar to making debit entries to loss accounts. Credit entries have the opposite effect.

When an asset is retired the first step is to bring the depreciation up to date. This is necessary because depreciation is often computed only when the books are closed, whereas it should be recognized for the use of the asset since the last closing. The next step is to eliminate the asset balances by crediting them and to eliminate the contra asset accounts by debiting them. The difference between the cost and accrued depreciation (net book value) is debited to a loss account if there are no removal costs or salvage, or to a suspense account if further entries are expected.

Example: Retirement of Fixed Asset—No Salvage or Removal Cost

Assume that a building is retired on April 1, 1957. The depreciation was last accrued for this asset on December 31, 1956. The annual depreciation is $12,000. The cost of the builidng as recorded in the general ledger is $200,000, and the allowance for depreciation, as of December 31, 1956, is $120,000. Enter in journal form the items necessary to record the retirement.

Solution

Depreciation Cost	$ 3,000	
Building, Allowance for Depreciation		$ 3,000
To accrue depreciation for the period Jan. 1—April 1, 1957		
Building, Allowance for Depreciation	123,000	
Loss on Retirement	77,000	
Building		200,000

Note: In this case the loss is equal to the book value of the asset, since there are no salvage or removal costs. The book value is the difference between the cost and accrued depreciation.

Example: Retirement of Fixed Asset, Assuming Salvage and Removal Cost

Assume the situation to be the same as in the preceding example, except that removal costs are $11,000 and salvage proceeds are $6,000.

Solution

Depreciation Cost	$ 3,000	
Building, Allowance for Depreciation		$ 3,000
To accrue depreciation for the period Jan. 1–April 1		
Building, Allowance for Depreciation	123,000	
Retirement Suspense	77,000	
Building		200,000
To write off the building cost and the allowance for depreciation		

Retirement Suspense	11,000	
Bank (or Accounts Payable)		11,000
To record the removal costs		
Cash	6,000	
Retirement Suspense		6,000
To record the salvage proceeds		
Loss on Retirement	82,000	
Retirement Suspense		82,000
To close out the retirement suspense account (it is a loss since it had a debit balance); the loss is also equal to the excess of the removal costs over salvage plus the book value of the asset at time of retirement		

This series of transactions can be recorded by following another procedure. For example, the salvage proceeds may be recorded as follows:

Cash	$6,000	
Salvage Revenues		$6,000

In like manner the removal costs may first be recorded in a cost account called "Removal Costs." The entry to record the removal may be recorded as follows:

Removal Costs	$11,000	
Cash		$11,000

When all salvage revenues and all removal costs have been recorded, the building may be written off the records and the gain or loss computed:

Allowance for Depreciation	$123,000	
Salvage Revenues	6,000	
Loss on Retirement	82,000	
Removal Costs		$ 11,000
Building		200,000

The foregoing entry closes out all revenue and cost accounts connected with the retirement of the building, and the net loss (or gain) on retirement is recorded at this time.

The main advantage of this procedure is that it highlights the importance of accumulating the costs of removal and salvage revenue figures. While part of the loss on retirement may be a result of past depreciation procedures, the cost of removal may be a result of inefficiency in this period.

Exchange of Assets. It is possible to make a book gain or loss from the exchange of assets. Since the transaction is essentially the sale (or retirement) of one asset and the acquisition of a new asset, the transaction may be split into two parts. It is important that the accountant penetrate beyond list price in recording this type of transaction because the real values of the new asset and the old asset may differ widely from the nominal values being cited by the traders.

Example.

The Rainy Taxi Company traded in one old cab on January 2. The old cab cost $2,000 and was 70% depreciated. The following facts are uncovered by the accountant:

List price of the new cab	$3,000
Trade-in allowance on old cab	1,100
Amount of cash paid	$1,900

Before trading in the old cab, the Rainy Taxi Company checked new and used car companies to see how much cash they would give for the old taxi. The best cash price offer received was $400. Record the trade-in in journal form.

Allowance for Depreciation	$1,400	
Taxi	2,300	
Loss on Retirement	200	
Taxi		$2,000
Bank		1,900
To record the trade-in		

The new taxi is recorded at $2,300, since that amount is equal to what the Rainy Company gave up, namely, *$1,900 cash and an old taxi which was worth at the most $400.*

The loss on retirement is equal to the difference between the value of the old taxi at the time of retirement ($400) and the book value of the old taxi ($600). It is also the balancing figure for the transaction. The transaction may be separated into two parts:

Allowance for Depreciation	$1,400	
Receivable, Dealer	400	
Loss on Retirement	200	
Taxi		$2,000
To retire the old taxi, record the loss on retirement, and the true value of the receivable against the taxi dealer		
Taxi	2,300	
Bank		1,900
Receivable, Dealer		400
To record the acquisition of the new taxi. Note that the new taxi is recorded at its true value rather than its list price.		

For income tax purposes the new taxi would be recorded at $2,500 ($1,900 plus the book value of the old asset, $600), and no gain or loss would be recognized on the trade.

Tangible Assets: Land. Generally speaking, land has an interminable life; thus it is not depreciated. The main problem in accounting for land is in deciding what costs are costs of land, cost of buildings, or cost of operations. This problem is particularly troublesome when a firm is first organized or where land is purchased for the construction of a building.

If land is purchased with the intention of constructing a building, then the costs of preparing the land for construction (but not digging the foundation) are costs of the land. This may include costs of draining the land or the cost of removing an existing structure. This situation differs from that in which the firm purchases land with a building and then operates the building for a number of years before replacing it. In this latter case the removal cost is associated with the loss on retiring the building. But where the land is purchased with the knowledge that there will be additional costs such as removing a structure already on the land, then these removal costs are truly costs of the land and not costs of the building which is going to be constructed.

The various costs associated with buying the land are also costs of the land. These include lawyer fees, survey costs, title insurance, and the like. If the land is purchased at a period of time prior to its use, then the various carrying costs for that period, such as taxes and interest, are also considered costs of the land. A warning should be injected here: Costs of this nature are not to be capitalized (charged to land) indefinitely. The decision to build must have already been made, and the projected date for starting construction must be only a reasonable distance in the future.

Land is not usually revalued in the accounts when it has appreciated or declined in value either because of changes in the general price level or because of changes in specific economic conditions. This results in a situation where the recording of the land value on the position statement has little or no relationship to the market value of the land.

Intangible Assets: Terminable Life. Some intangible assets, such as patents, have a life which is determined by law. In these cases the accountant uses the lawful life as the basis for computing the useful life of the assets, *unless* there is some reason to suspect that the useful life of the asset will be less than the legal life because of economic change.

As these intangible assets are amortized, the main asset account rather than a contra account is usually credited. This treatment is preferred in practice because the original cost of these assets is even further removed from value than fixed depreciable assets of a tangible nature. However, there is no objection to contra valuation accounts as are used with long-lived tangible assets.

What should be done with research or development costs which were not successful but which eliminated blind alleys and thus made possible the development of one valuable patent? As described here, they seem to be costs of the good patent; but what if they were far removed from the final patent? Obviously we reach a point where the judgment of the accountant is required to determine what costs should be capitalized or charged to expense.

Intangible Assets: Interminable Life. Goodwill is classified here as having an interminable life, not because the goodwill of a firm cannot be dissipated and its value reduced to zero, but because the life of this asset is indefinite. Goodwill can be interminable or it can have a terminable life.

What is goodwill? Goodwill is defined here as representing the present value of future earnings, in excess of what might be expected to be earned on the tangible assets used in the enterprise. Thus goodwill arises because of the expectation of exceptional earnings. Why does a firm have earnings higher than could normally be expected? There are many reasons, including customer acceptance, monopolistic position, innovating management, etc.

If goodwill arises because of the presence of exceptional earnings, does that mean that the accountant should record goodwill whenever earnings are found in excess of normal? Goodwill should be recorded only when it is purchased. This is usually interpreted to mean the purchase of one business entity by another business entity. Thus if firm A purchases firm B for $1,000,000, and the value of the tangible assets is only $750,000, then firm A has been willing to pay $250,000 for something of an intangible nature. The accountant calls this something "goodwill."

Should goodwill be recorded when purchased and then amortized? It is frequently not amortized, although it probably should be. Whatever gives rise today of the prospect of future earnings must be of terminable life. The life of this advantage should be estimated, and the goodwill should be written off over that life. At the end of this period the firm may still be making exceptional earnings, but it will be because of new factors, not the old purchased goodwill.

Organization costs are another troublesome item. What should be done with the costs connected with organizing a business? These costs will include lawyer fees, broker fees, and the costs and fees of the developers. Obviously they are not a cost of doing business in the first period of operations. Logically they should be written off over the entire life of the business entity. How long is the firm going to last? The normal business corporation has a charter which extends indefinitely, and the end of the life of the corporation cannot be predicted with any degree of accuracy. The result is a situation in which the organization costs are usually considered an asset which is not to be amortized. The justification for considering organization costs an asset is that the factors of production are more valuable when they are tied into a corporate entity by the organizers than when they are scattered over the economy. The objection to this interpretation is that the value of the corporate assets over and above their value as salable tangible assets lies in their earning power. The earning power is indicated by the results of operations past, present, and future, and not the balances in intangible asset accounts.

When the accountant records as assets those items which have no sale value (in the terminology of the economist, their opportunity cost is zero), then the position statement is weakened as a means of presenting the financial position of a business entity. What can be done with items that are not costs of this period but which are also of no value (included in this classification are organization costs, bond issue costs, stock issue costs, goodwill)? Probably the most acceptable solution is to record them at cost, or amortized cost, and to adjust the information presented for the specific purposes at hand.

QUESTIONS AND PROBLEMS

14–1. The Haber Uranium Company

The Haber Company purchased land in Arizona on which uranium had been discovered. The cost of the land was $1,000,000. Additional costs necessary to prepare the land for mining operations were $200,000. It is estimated that five million tons of ore containing uranium will be excavated before the mine is fully mined out. During the first period of mining operations 500,000 tons of uranium-bearing ore were dug and shipped to the refinery. The cost of getting the ore out of the ground into railroad cars was $930,000.

Required: Record the transactions in journal form.

14–2. The Hadley Company

The Hadley Company purchased a new lathe. The old lathe, with a net book value of $2,500 (it had originally cost $6,000), was removed at a cost of $600. It was sold for $200 as scrap. Additional work had to be done on the foundation before the new lathe could be installed; this cost $1,200. Other installation costs were $900, including $100 of factory overhead which was assigned, based on normal overhead rate.

The invoice cost of the new lathe was $10,000; terms, 2/10, n/30. Freight charges were $800. The discount was not taken, since the firm did not have the ready cash.

Required: Record in journal form the retirement of the old lathe and the acquisition of the new piece of equipment.

14–3. The Halsey Company

The Halsey Company traded in a car for a new model. The old car cost $3,000 and was 90% depreciated. The list price of the new car was $4,000, but the Sharp Car Agency offered to allow $1,100 on the old car. The Halsey Company had tried to sell the old car and the best cash price they had been offered was $380. The Sharp Car Agency offered to pay $380 cash for the old car if the Halsey Company did not want to trade it in.

Required

(a) Make the journal entries to record the trade-in from the point of view of the Halsey Company.

(b) Make the journal entries to record the trade-in from the point of view of the Sharp Car Agency.

14–4. The Harden Company

The Harden Company desired to build a hotel along the shore. Land of a suitable nature was scarce, so they finally bought the Dryden Hotel with the intention of tearing it down and building a more modern hotel on the site. The purchase was completed in October. Since this was the beginning of the season, the Harden Company continued to operate the Dryden Hotel until April 1, and then it had contractors begin the work of tearing it down. The following information is made available to you:

Total purchase price of land and hotel	$2,000,000 *
Lawyer fees, title search, etc.	20,000
Operating profit of Dryden Hotel (October 1–April 1)	300,000
Cost (net of salvage) of removing the Dryden Hotel	350,000
Cost of enlarging foundations	100,000

* The hotel was appraised for tax purposes at $1,000,000 and the land at $500,000.

Required: Prepare a schedule showing the cost of the land.

14–5. The Hardy Company

The Hardy Company ceased operations in its Illinois plant on July 1, 1957. On August 1 it was decided to dismantle the equipment and sell the plant. The cost of dismantling the equipment was $7,000. The equipment was sold for scrap and second-hand equipment for $20,000. The plant was sold for $120,000, and there were expenses of $6,000 connected with the sale. Depreciation was last accrued on the plant and equipment on December 31, 1956. The January 1, 1957, balances in the plant and equipment accounts of the Illinois plant were as follows:

Plant	$2,000,000
Plant, Accumulated Depreciation	1,550,000
Equipment	400,000
Equipment, Accumulated Depreciation	320,000

The building depreciation was $4,000 per month, and the equipment depreciation was $3,000 per month.

Required: Prepare journal entries to record the depreciation for the period; also the retirement of the plant and equipment of the Illinois plant.

14–6. The Harper Automobile Company

The Harper Automobile Company has been negotiating with the Airflight Plane Company on the subject of a merger. The asset side of the position statement of the Harper Company includes the following items:

Goodwill	$50,000,000
Organization Costs	10,000,000
Bond Issue Costs	500,000
Stock Issue Costs	1,000,000
Patents	9,000,000

Required

(a) Explain briefly the origin of these items.

(b) If you were a member of the management of the Airflight Company, how would you treat the items in forming an opinion of the value of the Harper Company?

(c) The accountant adopts a "going-concern point of view." Explain the significance of this convention with reference to the given items.

14–7. The Harrison Company

1. Stockholders invest $1,000,000.
2. The company purchases and pays cash for the folliwing long-lived assets:

Coal Mine	$200,000	(containing an estimated 400,000 tons of coal)
Equipment	300,000	(with an estimated life of 10 years)
Buildings	100,000	(with an estimated life of 20 years)

3. Supplies are purchased on account, $3,000. (terms 2/10, n/30).
4. The company starts operations on July 1, 1957. During the first accounting period 5,000 tons of coal are mined. Costs incurred during this period (July 1–December 31) include the following:

Administrative Salaries (paid)	$ 6,000
Selling Expense—Salaries (paid)	2,000
Direct Labor Mining (paid)	20,000
Mining Supplies used	1,000

5. During the period July 1–December 31 the company sold and shipped 4,000 tons of coal at a price of $15 per ton; terms, 3/15, n/30. All sales were on account.
6. Accounts payable paid during the period were $3,000. This included $60 of discounts which were allowed to lapse.

7. Accounts receivable collected during the period were $40,000. In addition, $100 was collected from customers because of the lapsing of sales discounts.

Required

(a) Record the given transactions and any other adjusting entries indicated as being necessary.
(b) Record the closing entries required on December 31, 1957.
(c) Prepare the position statement as of December 31, 1957 and the income statement for the period July 1–December 31, 1957.

15

Inventories

ACCOUNTING FOR INVENTORIES gives rise to many interesting and important accounting problems. Three of these problems will be introduced in this chapter:

1. What costs are inventoriable?
2. What is the flow of costs?
3. Should cost or market values be used to value inventories?

What Costs Are Inventoriable? What costs should be included in computing the costs of inventories? There is general agreement that inbound freight costs are to be included; some accountants argue that purchasing costs, material handling, and storage costs are also properly included as costs of inventory. There does not seem to be a clear-cut line of distinction between inventoriable and noninventoriable costs. The costs absolutely necessary for obtaining the inventory and placing it into storage are reasonable charges into inventory. The costs arising from inefficiency or prolonged storage of the items in inventory are period charges, and to place these items into inventory would be in error.

An example of an item clearly not inventoriable is the demurrage charge arising from holding a railroad car an excessive period of time. There is always the danger of items of this nature being buried with the normal freight charges. This should be avoided, since the demurrage charge arises either from inefficiency or unusual circumstances and should not be considered a cost of the goods purchased. Other examples of charges which should be excluded from inventory are purchase discounts. Whether they are lost or taken, they are not a cost of the purchased material.

From a practical point of view it would not be unreasonable for a nonmanufacturing firm to place into inventory only the net invoice price, freight, and the handling costs of placing the materials in their storage place. Other costs would be considered expenses of the period.

Inventoriable Costs of Manufacturing Firms. What costs are inventoriable if the firm is processing a product, i.e., engaged in a manufacturing process? There is no one answer to this question. A narrow point of view would inventory only the direct variable costs (this would usually include only direct material and direct labor). A somewhat broader viewpoint would include all other variable costs connected with the manufacturing process (indirect variable materials, indirect variable labor and other variable costs such as power would be included). The generally accepted accounting treatment of manufacturing costs is somewhat broader. All costs connected with the manufacturing process are considered inventoriable. This differs from any of the three preceding procedures by the inclusion of fixed costs in the inventoriable classification.

There still remains the problem of identifying those costs which are connected with the manufacturing process. There are many borderline cases. Which of the following costs should be considered inventoriable: cost accounting department costs, factory supervisors' salaries, quality control department costs, part of the president's salary (consistent with the amount of time spent with manufacturing problems)? While there are problems of assigning the costs to specific products, all the above costs should be considered inventoriable. Examples of costs that are *not* inventoriable are selling expenses, income taxes, advertising expenses, shipping expenses out, and sales invoice preparation. While costs of this nature are not generally considered inventoriable, since they are usually associated with products no longer in inventory (which have been sold), they should be allocated to different product lines so that the "income" of a product line will be the amount remaining after all costs have been subtracted.

What Is the Flow of Costs? It is necessary to distinguish between the *flow of the physical units* of inventory which pass through the plant and are shipped to customers and the *flow of costs.* The flow of the physical units may be the result of a material handling arrangement which ensures that the oldest goods are sold or used first. The costs of inventory which are charged to expense may or may not be the costs of the oldest goods on hand. This would depend on which of several accounting conventions is adopted by the corporation. There are various assumptions that the accountant may make. The following are the most common, although by no means complete the list:

1. The oldest goods are sold or used first—FIFO (first in first out).
2. The last goods purchased are sold or used first—LIFO (last in first out).
3. The goods are "homogenized," and goods used are of average cost and age—Average Cost.
4. Identify the specific units used.

In actual practice the *physical flow* of goods will frequently *not* correspond to the method chosen by the accountant to record the *flow of costs.* In fact, it will be an infrequent situation when the flow of costs exactly match the physical flow of the inventory.

Flow of Costs: FIFO. The FIFO procedure of accounting for inventory charges the costs of the first goods purchased to expense. This means that the cost of the goods appearing in inventory will be the cost of the most recent goods purchased (a reasonable situation).

Example

The Sample Company uses an FIFO procedure for accounting for merchandise. The Company has an opening inventory of 100 units which cost $2.00 each.

Purchases During the Month

Jan. 15	200 units @ $2.10 =	$ 420.00
Jan. 24	300 units @ $2.20 =	660.00
Jan. 30	100 units @ $2.25 =	225.00
	600	$1,305.00

During the month of January, the company sold 500 units.

Required: Compute the cost of goods sold and ending inventory.

Cost of Goods Sold:

100 units @ $2.00 =	$ 200.00
200 units @ $2.10 =	420.00
200 units @ $2.20 =	440.00
500	$1,060.00

Ending Inventory:

100 units @ $2.25 =	$225.00
100 units @ $2.20 =	220.00
200	$445.00

The answers may be checked by adding the ending inventory and the cost of goods sold ($1,060 plus $445 = $1,505). This should be equal to the opening inventory plus the cost of the goods purchased during the period ($200 plus $1,305 = $1,505).

Flow of Costs: LIFO. The LIFO procedure of accounting for inventory charges the costs of the last goods purchased to expense. This means that the cost of the goods appearing in ending inventory will be the cost of the oldest goods purchased; this will be the opening inventory plus additions (or less deductions) during the period. If there have been changes in the general price level, or changes in the cost of goods being purchased, this inventory can become far removed from either the actual *cost* of the goods on hand or their present value.

Example

Assume that the Sample Company is using a LIFO procedure. Compute the cost of goods sold and the ending inventory. (See the FIFO section.)

Cost of Goods Sold:

100 units @ $2.25 =		$ 225.00
300 units @ $2.20 =		660.00
100 units @ $2.10 =		210.00
500		$1,095.00

Ending Inventory:

100 units @ $2.00 =		$200.00
100 units @ $2.10 =		210.00
200		$410.00

The answers may be checked by adding the ending inventory and the cost of goods sold ($1,095 plus $410 = $1,505). This should be equal to the opening inventory plus the cost of the goods purchased during the period ($200 plus $1,305 = $1,505).

Flow of Costs: Average Cost. The average cost procedure of accounting for inventory charges an average of the costs of the goods purchased during the period and the opening inventory to expense. This should be a weighted average and not just a simple average of the prices. For instance, again referring to the Sample Company example, it would not be correct to add up the prices and then take an unweighted average as follows:

Prices of Goods Purchased and Opening Inventory

Opening Inventory	$2.00
Jan. 15th purchase	2.10
Jan. 24th purchase	2.20
Jan. 30th purchase	2.25
	$8.55

Dividing by 4 would give $2.14. This is *incorrect* because it fails to take into consideration the fact that the Jan. 24th purchase is for 300 units, while the Jan. 30th purchase is for 100 units.

Example

Assume that the Sample Company is using an average cost procedure. Compute the cost of goods sold and the ending inventory.

Opening Inventory	100 @ $2.00 =	$ 200.00
Jan. 15th purchase	200 @ 2.10 =	420.00
Jan. 24th purchase	300 @ 2.20 =	660.00
Jan. 30th purchase	100 @ 2.25 =	225.00
	700	$1,505.00

$$\frac{\$1{,}505}{700} = \$2.15 \text{ average cost per unit}$$

$$\begin{aligned}
\text{Cost of goods sold} &= \$2.15 \times 500 = \$1{,}075 \\
\text{Ending inventory} &= \$2.15 \times 200 = \phantom{\$1{,}}430 \\
& \hphantom{= \$2.15 \times 200 = {}} \underline{\underline{\$1{,}505}}
\end{aligned}$$

Flow of Costs: Indentification of Costs of Specific Units. In some situations accountants will attempt to identify the actual costs of specific units. In most cases, this procedure will be too expensive; in other cases it will be impossible. The benefits at best are doubtful and not worth the cost, except where high-cost items are being sold and the cost of specific items can be easily traced.

Cost or Market, Whichever Is Lower. The FIFO, LIFO, and average cost procedures are all concerned with determining the cost of the ending inventory. If FIFO or average cost is used, it is current practice to compare the cost (as determined by using one of these procedures) to the "market" price of the item, and take the *lower* cost for the valuation of the inventory. This procedure results in a conservative inventory, since the inventory is *always* written *down* to market but *never up* to market. The inconsistency may be explained by the rule of thumb, followed by accountants, which recognizes all losses but does not recognize gains until they are realized.

The journal entry to record the write-down to market takes various forms. The debit may be to "Cost of Goods Sold" or to a "Loss" account. The credit may be to the "Inventory" account or to a contra asset account, "Reserve for Market Valuation," which is subtracted from the inventory account for statement purposes. The entry made directly to inventory is to be preferred because it avoids the use of an unnecessary account which may be confusing.

The cost or market rule has been attacked by accounting theoreticians on the grounds that it is not consistent (inventories are written down to market but never up to market), and that it is not even truly conservative (in the next period, the income will be higher if the inventories are written down in this period). It also suffers from confusion as to what is meant by "market." Despite these valid objections, the cost or market rule is firmly entrenched among practicing accountants.

From the managerial point of view the write-down to market is desirable to prevent the subsequent year from being charged with unrealistic costs, and to prevent the inventory presentation from being overstated on the position statement. Managerial accounting differs from accounting practice in that write-ups to market would also be desirable to be better able to judge managerial performance in the next period, and to present more realistic inventory figures on the position statement.

The internal revenue code generally does not attempt to tell corporations how they should treat items from an accounting point of view. The one exception is that the code does prevent the use of LIFO combined with cost or market for tax or reporting purposes. Thus, if a firm uses LIFO for tax purposes, it must use LIFO in its accounting records and not adjust to market. The internal revenue code may be expected to change through the years, but the basic incompatability of LIFO and the lower of cost or market will remain.[1]

Example

At the end of the calendar year, the Sample Company's raw material inventory sheet showed the following items. Using "cost or market, whichever is lower," determine the dollar amount of raw material inventory.

Solution

Material	Units	Cost Per Unit	Market Price Per Unit	Cost	Market	Cost or Market—The Lower
A	100	$1.00	$0.80	$ 100	$ 80	$ 80
B	200	2.00	2.10	400	420	400
C	150	3.00	3.00	450	450	450
D	300	2.20	2.00	660	600	600
				$1,610	$1,550	$1,530

There are actually two acceptable answers: $1,550 or $1,530. Determining the lower of cost or market by individual items will always give the *lower* inventory figure.

Perpetual and Periodic Inventory Procedures. When goods are sold and shipped or placed into production, this may or may not be the signal for an accounting entry. If the company is following a perpetual inventory procedure, entries will be made as follows:

Accounts Receivable	$150	
Sales		$150
To record sales of $150		
Cost of Goods Sold	100	
Merchandise		100
To record the sale of inventory which cost $100		

If the company is following a periodic inventory procedure, only the entry to record the sale is made, and no entry for cost of goods sold will be made at the time of the sale. At the end of the accounting period, an inventory will be taken and the difference between the goods purchased (including the opening inventory) and the physical inventory will be charged to costs of goods sold.

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[1] Cost or market is not used if LIFO is used. If it were used, the inventory would be written down to the lowest market prices encountered after the adoption of LIFO. What would happen if some of this old inventory were then used for current sales?

Example

January 1 Inventory	$5,000
Purchases	4,000
	$9,000

If the physical ending inventory is $3,000, the cost of goods sold will be $6,000. The journal entry would be:

Cost of Goods Sold	$6,000	
Merchandise		$6,000
To record the cost of goods sold for the period		

When a perpetual inventory procedure is used, any difference between the physical inventory and the book inventory will be considered as an inventory adjustment. It could be treated either as an adjustment to cost of goods sold or as a separate adjustment.

Example

Book Inventory, Dec. 31	$3,200
Physical Inventory, Dec. 31	3,000

Adjustment:

Cost of Goods Sold	$200	
Merchandise		$200
To adjust the book inventory to agree with the physical inventory		

An alternative entry would be:

Inventory Adjustment	$200	
Merchandise		$200

This entry differs from the first entry only in that the inventory adjustment is recorded in a separate account and identified as an adjustment rather than buried in costs of goods sold. The reasons for the adjustment should be thoroughly investigated if the amounts are significant. Whenever possible, the burying of this adjustment in cost of goods sold should be avoided, for management should be interested in the size of the adjustment. Large adjustments may indicate faulty costing or inventory control procedures.

The Effect of Perpetual and Periodic Inventory Procedures on the Cost of Inventory. In certain situations, the cost of the ending inventory will be affected by whether or not the company is using a perpetual or periodic costing procedure.

If the FIFO procedure of accounting for inventory is used, then it makes *no difference* whether the periodic or perpetual procedure is used to relieve the inventory account. The oldest goods are charged first, and the charges to cost of goods sold will not be affected by whether the computation is made at the time of sale or at the end of the accounting period.

If the LIFO or average cost procedures of accounting for inventory are used, then it *will* make a difference whether the periodic or perpetual procedure is used in determining cost of goods sold and ending inventory.

Example

Assume that the Sample Company uses a LIFO procedure for accounting for merchandise. The Company has an opening inventory of 100 units which cost $2.00 each.

	Purchases	*Sales*
Jan. 10	....	80 units
Jan. 15	200 units @ $2.10	
Jan. 20	....	220 units
Jan. 24	300 units @ $2.20	
Jan. 29	....	200 units
Jan. 30	100 units @ $2.25	
	600	500

Required

(a) Determine the cost of goods sold, using LIFO periodic costing procedure.

(b) Determine the cost of goods sold, using LIFO perpetual costing procedure.

Solution

(a) The cost of goods sold is $1,095 and the ending inventory is $410. For the computations, see the section on LIFO.

(b) If a *perpetual* costing procedure is used, the solution is complicated by the fact that the sale is assumed to consist of the last goods on hand *at the time of the sale.* For example, the sale of Jan. 10 must have been made using the opening inventory which cost $2.00 per unit. The sale of Jan. 20 was made using the 200 units purchased on Jan. 15 and 20 units of the opening inventory. The sale of Jan. 29 was made using the units purchased on Jan. 24.

LIFO: PERPETUAL
COST OF GOODS SOLD

Date of Sale	Units	Cost of Last Goods Purchased	Cost of Goods Sold
Jan. 10	80	$2.00	$160
Jan. 20	200	2.10	420
	20	2.00	40
Jan. 29	200	2.20	440
	500		$1,060

LIFO: PERPETUAL
ENDING INVENTORY

Date of Purchase	Units	Cost of Purchase	Inventory Cost
Jan. 24	100	$2.20	$220
Jan. 30	100	2.25	225
	200		$445

It is interesting to note that, in this special case, the LIFO perpetual procedure has given the same results as would be obtained by using FIFO.

A perpetual average cost procedure would require a new computation of the average cost to be used for costing out inventory after each *purchase*. Since a *sale* does *not* disturb the average cost, it would *not* necessitate a computation of a new average cost.

Evaluation of Perpetual and Periodic Procedures. The most forceful argument in favor of the perpetual inventory procedure is the fact that it gives a positive control over the inventory. At any moment in time, management can find out how many units and dollars of inventory are on hand. When a physical inventory is taken, it can be compared with the perpetual inventory record and differences investigated. The periodic inventory procedure loses control by failing to maintain a record of how many units or dollars of inventory should be on hand.

If the perpetual procedure is used with FIFO or LIFO, the bookkeeping procedures are somewhat complex, since the dates of inventory on hand must be maintained so that the oldest (or latest) of the inventory will be costed first. If average cost is used, then the bookkeeping becomes somewhat even more time-consuming, especially if there are frequent receipts of material. At a minimum, a perpetual inventory procedure will require many more postings to inventory cards than the periodic procedure.

It is possible to compromise and obtain many of the advantages of the perpetual inventory procedure without incurring excessive clerical costs. For one thing, it is possible to maintain perpetual records in terms of *physical units* but make the dollar entries only periodically. This eliminates the pricing problem (the problem of determining the cost of the units sold). A second procedure that is frequently used is to make use of a set price (it may be a standard price or the most recent purchase price) to relieve inventory, and then to adjust the inventory at the end of the accounting period to conform to one of the conventional costing procedures (FIFO, LIFO, etc.).

Does the periodic or perpetual costing procedure give better results from a financial accounting point of view? Which gives a more significant cost of goods sold or a better inventory figure? It is impossible to say that one method is "better" than the other. It can be recognized that if FIFO is used, the choice of periodic or perpetual procedures will have *no* effect on inventory or cost of goods sold. If LIFO is used, the choice will have an effect, but a general conclusion as to whether the effect is good or bad is impossible. The problems of accounting for inventory as they affect the financial statements are more related to the choice of the costing procedure for the flow of costs (FIFO, LIFO, etc.) than they are to the application of either the perpetual or periodic procedure.

Size of Inventories. To buy and hold idle inventories costs money. There are storage costs, handling costs, interest charges, insurance expenses, property taxes, spoilage, obsolescence, etc. It has been estimated that the annual charges average about 25% of the cost of the inventory. The costs will vary with the characteristics of the inventory, but they will always be a significant amount. Thus the size of the inventories should be carefully controlled. There are scientific methods of determining the optimum inventory size, and these will be discussed in Chapter 27. It is important at this point to appreciate the facts that excessive inventories cost money and that inadequate inventories can mean lost sales and customer antagonism.

Inventory Reserves. The term *inventory reserve* often appears in financial reports. This is unfortunate as well as unnecessary. There are no situations that cannot be handled without the use of these confusing accounts.

The "Reserve for Possible Price Decline" account has justly fallen into disrepute. The accepted theory is that price declines of the future cannot be forecasted or reported by the accountant in the present. This item is actually retained earnings and should be clearly indicated as such. Any asset may decrease in value or become worthless, but this is not justification for setting up "reserves" for these contingencies. These reserves are subdivisions of total retained earnings and serve no useful function.

The "Reserve for Obsolescence" account is not necessary, since there is no reason why the inventory cannot be written down to reflect changing conditions. If, because of change, the inventory has decreased in value, this fact should be recorded by a debit to an expense account and a credit to inventory, not a credit to a nebulous reserve account.

The term *LIFO reserves* is even more cloudy than the other reserve accounts. There is no uniform agreement as to what is meant by the term, though it is occasionally used. It may refer to "secret retained earnings" arising from the understatement of inventory and the accompanying understatement of retained earnings. If there has been a price decline since switching to LIFO, then the LIFO reserve would in effect be a contra to the inventory account, writing it down to the current prices. It would actually be better to write the inventory down rather than use the confusing reserve account, which has a tendency to end up incorrectly on the equity side of the position statement.

QUESTIONS AND PROBLEMS

15–1. The Pond's Company

At the end of the calendar year, the Pond's Company's raw material inventory summary sheet consisted of the following items:

Material	Units	Cost per Unit *	Market Price per Unit
A	1,000	$ 8	$ 7
B	1,200	5	4
C	1,600	10	8
D	800	6	10

* Assuming an FIFO flow.

Required

(a) Using the "Cost or Market, Whichever is Lower" procedure, determine two possible valuations of the inventory.

(b) Assuming the December 31 balance (prior to adjusting entries) in the inventory account to be $34,800, prepare necessary journal entries to record the information obtained in part (a).

(c) Comment briefly on the use of the cost or market procedure.

15–2. The Curry Company

The Curry Company had a beginning inventory of 500 units priced at $10 each. During the week of April 1–7, the following transactions took place:

Date	Units Received	Sale Units	Sale Dollars
April 1	————	100	$2,000
April 2	————	150	3,000
April 3	————	——	——
April 4	600 @ $15	200	4,000
April 5	————	300	6,000
April 6	————	50	1,000
April 7	500 @ $16	400	8,000
		1,200	

Required

(a) Using a LIFO periodic inventory procedure, compute the "Cost of Goods Sold" for the week.

(b) Using a LIFO perpetual inventory procedure, compute the "Cost of Goods Sold" for the week.

(c) Repeat parts (a) and (b), assuming that a FIFO procedure is used.

(d) What journal entry is required if FIFO is used and a physical inventory of April 7 shows that there are 350 units on hand?

15–3. The ABC Company

The ABC Company's activities with regard to one of its products during 1955 were as follows:

Jan. 1	Beginning inventory: 20,000 lb. @ $1.00 per lb.
Jan. 15	Sales: 15,000 lb. @ $2.00 per lb.
Mar. 15	Purchases: 40,000 lb. @ $1.05 per lb.
June 30	Sales: 35,000 lb. @ $2.10 per lb.
Sept. 15	Purchases: 30,000 lb. @ $1.10 per lb.
Dec. 15	Sales: 15,000 lb. @ $2.15 per lb.
Dec. 15	Replacement cost was $1.10 per lb.

During 1956, the Company's activities with regard to the same product were as follows:

Jan. 15	Purchases: 30,000 lb. @ $1.10 per lb.
April 15	Sales: 35,000 lb. @ $2.15 per lb.
Sept. 16	Purchases: 20,000 lb. @ $1.15 per lb.
Dec. 20	Sales: 30,000 lb. @ $2.20 per lb.
Dec. 31	Replacement cost was $1.20 per lb.

Required

(a) The 1955 gross margin figure if FIFO has been applied on a periodic (or physical inventory) basis: [1] $__________

(b) The 1955 gross margin figure if LIFO has been applied on a periodic (or physical inventory) basis: $__________

(c) The 1955 cost of goods sold figure if LIFO has been applied on a continuous (or perpetual inventory) basis: $__________

(d) The 1955 cost of goods sold figure if the average cost procedure has been used: $__________

(e) Will the ABC Company's cost of goods sold for the year 1956 be lower or higher under LIFO (periodic inventory) than it would have been under FIFO? Assume that the same method was used in both years.
   1. How much higher or lower?
   2. Explain why such relationship exists for the ABC Company in 1956.

15–4. The Rusty Steel Company

The Rusty Steel Company shifted to the LIFO method of accounting for inventory in 1929. At that time, the inventory of Type A-1 steel plate was 1,000 tons, with a cost of $100 per ton.

In 1932 the Company decided to continue using LIFO, but it also incorporated the "Cost or Market, Whichever Is Lower" criterion. Cost was computed by using a LIFO assumption as to flow. At that time the inventory of Type A-1 steel plate was 2,000 tons, and the market value was $40 per ton (cost ranged from $50–$100 per ton). The following entry was made to write the inventory down to market:

---

[1] Gross margin is the difference between sales and cost of goods sold.

Loss on Inventory Price Decline	$80,000	
Inventories		$80,000

From 1932 to 1957 inventories of Type A-1 steel plate increased each year, and the market value was never lower than $40 per ton. In 1957 the finished goods inventory of A-1 steel plate decreased to 500 tons. In 1957 a ton of steel plate of this type cost $200 per ton to produce (the market value was greater than $200).

Required

(a) Comment on the write-down of inventory in 1932 and the procedure used since then (LIFO plus Cost or Market).

(b) How would the income for 1957 be affected by the fact that inventory was decreased by at least 1,500 tons?

15–5. The Tompkins Manufacturing Company

The Tompkins Manufacturing Company's manufacturing overhead account was debited for $680,000 during the month of March. A review of the entries to the account disclosed the composition of the debits to be as follows:

Indirect Manufacturing Labor	$200,000
Indirect Manufacturing Supplies	100,000
Selling Expense (an allocation)	50,000
Cost Accounting Department Costs	40,000
Income Taxes (an allocation)	110,000
Factory Supervision	70,000
Advertising Expense	10,000
President's Salary (an allocation)	14,000
Shipping Expense	16,000
Material Handling Costs	20,000
Packing Costs	50,000
	$680,000

Required

(a) Analyze and adjust the manufacturing overhead cost account as necessary.

(b) Describe briefly a general rule for determining what costs of a manufacturing firm are inventoriable.

15–6. The James Manufacturing Company

During the month of January, the James Manufacturing Company's raw material account was debited for $450,000. A review of the entries to the account disclosed the composition of the debits to be as follows:

Material Purchased (gross price)	$400,000
Freight-in (including demurrage charges of $3,000)	12,000
Receiving Department Costs	20,000
Material Handling and Storage Costs	8,000
Allocation of Selling Department Costs	7,000
Shipping Department Costs	3,000
	$450,000

The Company follows a procedure of crediting a "Purchase Discount Revenue" account when purchase discounts are taken or lost. Terms of purchase are 2/10, n/30.

Required

(a) Analyze and adjust the raw material account as necessary.

(b) Describe briefly a general rule for determining what costs are to be considered as cost of material purchases.

15–7. The D. Jones Ship Company

The D. Jones Ship Company has received an order on July 1, 1958, to build a 110,000-ton tanker. The costs connected with obtaining the sale were $20,000, and these were all incurred in 1958. It is estimated that the tanker will take 24 months to build.

Required: How should the selling costs be treated? How should the costs connected with constructing the ship be treated? When should the revenue from the sale of the ship be recognized?

15–8. The D. Jones Ship Company

In 1945 the D. Jones Ship Company built a new type of tanker on speculation. The tanker was of a different type of construction, making use of cement rather than steel plate. The Company is carrying the cost of the ship in an inventory account (the ship is in dry dock), but as of 1958 it has been unable to sell the ship and has not built any further models. The inventory account for this ship includes the following items:

Cost of Construction	$2,000,000
Cost of Plans, etc.	200,000
Cost of Dry Dock and Maintenance	1,000,000
	$3,200,000

Required: Comment on the accounting treatment of the cost of the cement tanker.

15–9. The Ithaca Gas Company

The Ithaca Gas Company has a problem arising from the seasonal nature of its product. People use more gas in the winter to heat their homes and for cooking. This creates the problem of peak loads. The problem is made even more difficult by the fact that there are five or six exceptionally cold days each winter during which time the demand for gas increases tremendously. Rather than build pipe lines for the peak loads, the daily fluctuations are handled by the use of gas tanks. The peak loads created by seasonal demands have been somewhat solved by the use of underground storage. Gas is pumped underground under pressure during the summer and then used in the winter. Of the $10,000,000 worth of gas pumped underground during the first year of operating the underground storage, it is estimated that $7,000,000 will never be recovered (this amount of gas is required to build up the pressure so that gas may be taken out).

Required: Should the $7,000,000 be treated as inventory? Does a manufacturing firm have a similar problem?

16

Notes and Interest

The problems of recording interest-bearing debts due in less than one year are treated in this chapter. Since the debts have less than one year to maturity, the problems of compound interest will be avoided. It is assumed that the interest is computed using an annual rate of interest and that it is not compounded during the year.

Notes Receivable and Payable. The term *note* is used here in a generic sense to represent a written promise to pay made by the *maker* to the holder of the note, the *payee.* The amount is to be paid at some definite date in the future. To the maker of the note the promise to pay is a "Notes Payable," and to the payee a "Notes Receivable."

Notes may come into being for various reasons. It may be that money is lent, a note is accepted instead of an open account (accounts receivable), or a note is accepted at the time of sale.

Example: Issuance and Receipt of Notes

Maker			*Payee*		
Cash	$500		Notes Receivable	$500	
Notes Payable ...		$500	Bank		$500
To record the borrowing of $500			To record the lending of $500		
Accounts Payable	300		Notes Receivable	300	
Notes Payable ...		300	Accounts Receivable		300
A note is issued in payment of an open account			A note is accepted as payment of an open account		
Merchandise	200		Notes Receivable	200	
Notes Payable ...		200	Sales		200
Purchase of merchandise			A note accepted for the sale of the merchandise		

Computation of Interest. Notes usually indicate the rate of interest and a due date. If a due date is not specifically stated, then the life of the note is indicated (60-day note, one-month note, etc.). It is necessary to compute interest on the principal of the note in order to find the total amount to be paid at maturity.

Two methods of computing interest will be illustrated here, and they both make use of the formula:

$$\text{Interest} = \text{principal} \times \text{interest rate} \times \frac{\text{number of days}}{\text{number of days in year}}$$

The problems arise in computing the fraction of a year. There are two choices:

Exact number of days divided by 365 days
Exact number of days divided by 360 days

The second procedure is frequently used because (1) it is simpler, and (2) it results in earning more interest for the payee of the loan. Because of the first reason it will be used to illustrate computations in this chapter.

If a note is a two-month note, it will be due on the anniversary date two months hence. Thus a two-month note dated January 15 will be due March 15 (March 16 if March 15 is a Sunday or a holiday). A two-month note dated December 30 will be due March first, since there is no February 30.

If the number of days are specified (such as a 60-day note), then the due date may be found by adding 60 days to the date of the note. Either the first or last day of the note is not counted in counting the number of days. Thus a 30-day note dated December 1 would be due December 31. The answer may be checked by subtracting 1 from 31. If the note dated December 1 were a 60-day note, it would be due January 30.

When a note is for a complete year, the amount of interest is the principle times the interest rate (the principal is *not* multiplied by $^{365}/_{360}$).

Entries for Interest. If the accounting period ends before the note has been collected or paid, then the accountant must accrue an appropriate amount of interest.

Example

The ABC Company is the maker of a 90-day, 6%, $1,000 note dated December 1. Accrue interest on December 31 and record the payment on the due date to the payee of the note, the XYZ Company.

Maker ABC COMPANY			*Payee* XYZ COMPANY		
Dec. 1					
Merchandise	$1,000		Notes Receivable	$1,000	
Notes Payable ..		$1,000	Sales		$1,000
To record the issuance of the note			To record the sale and the receipt of the note		
Dec. 31					
Interest Charges ..	5		Interest Receivable ..	5	
Interest Payable .		5	Interest Revenue ..		5
To accrue interest charges for 30 days			To accrue interest revenue for 30 days		

$$\$1{,}000 \times 6\% \times \frac{30}{360} = \$5$$

Mar. 1					
Interest Charges ..	10		Cash	1,015	
Interest Payable ..	5		Interest Receivable		5
Notes Payable	1,000		Interest Revenue ..		10
Bank		1,015	Notes Receivable ..		1,000
To record the interest for 60 days and the payment of the interest and maturity value			To record the collection of interest and principal		

The preceding interest computation could have made use of the 6% rule. Six per cent (annual rate) is equal to *1% for 60 days.* Thus, to find the interest for 30 days, take 1% of $1,000 and divide by 2. To find the interest for 60 days, take 1% of $1,000. The 6% rule may also be used even if the interest rate is different from 6%, or if the number of days differ from 30 or 60. For example, if the interest rate is 3% and it is desired to compute the interest for 60 days, take 1% of the principal and divide by 2 (since the 3% interest rate is one-half of 6%). With a little practice the 6% rule can be developed into a valuable tool. It is, of course, useful only when the assumption has been made and accepted that there are 360 days in the year for purposes of computing interest.

Other paths may be followed to arrive at the same accounting objective of accruing interest. Therefore it is probable that the reader may wish to make entries for interest in a different manner. This is not only allowable but even desirable, as long as they are made correctly. The check is to test alternative procedures against the interest charges (and revenues) accrued on December 31 and March 1 in the foregoing example. These should be the same no matter what procedure is followed.

Some accountants follow a procedure of making "reversing entries" on January 1 for the interest accrual made on December 31. On March 1 an entry is made to interest charges for $15 (since there is a $5 credit resulting from the reversing entry, the net charge is $10). This procedure is correct and even has certain advantages from a bookkeeping point of view. The bookkeeper can be told to record the debit for all payments of interest to interest charges.

Example: Reversing Entries (using data of preceding example)

ABC COMPANY			XYZ COMPANY		
Dec. 31					
Interest Charges ..	$ 5		Interest Receivable ..	$ 5	
Interest Payable.		$ 5	Interest Revenue ..		$ 5
To accrue 30 days' interest; the interest charges would be closed to the income summary					
Jan. 1					
Interest Payable ...	5		Interest Revenue	5	
Interest Charges.		5	Interest Receivable.		5
To reverse the entry made on December 31					
Mar. 1					
Interest Charges ...	15		Cash	1,015	
Notes Payable	1,000		Interest Revenue ..		15
Bank		1,000	Notes Receivable ..		1,000
To record the payment of $15 interest and $1,000 of principal					

The interest charges for the second year are $10 (the sum of a debit of $15 and a credit of $5), which is logical, since $10 is 60 days' interest on $1,000 principal.

The computation of the maturity date was as follows:

Period	*Number of Days*
Dec. 1–31	30 *
Jan. 1–31	31
Feb. 1–28	28
Mar. 1	1 **
	90

* Not counting the first day.
** Counting the last day.

Noninterest-Bearing Note. Frequently a note will not bear an explicit rate of interest but will merely indicate the amount due at maturity. For example, a note dated December 1 may promise to pay $1,000 on March 1 of the next year. A mistake is frequently made by recording the note on receipt (or issuance) at its maturity value. This procedure ignores the fact that a $1,000 note due in 90 days is not worth $1,000 now. To properly record the transaction involving this type of note, it is necessary to determine the effective implicit rate of interest and to compute the present value of the maturity amount.

Example

Assuming that the effective rate of interest for short term loans is 6%, what is the present value of $1,000 due in 60 days?

Let:

$$A = \text{present value of \$1,000 due in 60 days}$$

Then $1,000 is equal to A plus the interest on A dollars for 60 days. This may be expressed as follows:

$$\$1{,}000 = A + A\left(0.06 \times \frac{60}{360}\right) = A + A\,(0.01)$$

If A is factored out of the right-hand side,

$$\$1{,}000 = A\,(1 + 0.01) = 1.01A$$

Solving for A:

$$A = \frac{\$1{,}000}{1.01} = \$990.10$$

This amount of $990.10 is the present value of $1,000, assuming a 6% rate of interest. This may be checked by taking 1% of the $990.10 and adding it to $990.10 to see if $1,000 is obtained.

1% × $990.10 =	$ 9.90	Interest for 60 days
	990.10	Present Value
	$1,000.00	Maturity Value

Note that the amount of interest is 1% of $990.10 and not 1% of $1,000.

Instead of a rate of "interest" banks frequently use a rate of "discount." This discount rate is applied to the maturity amount to compute the amount of discount or interest to be paid. If the bank discount rate is 6%, then the amount of interest will be $10 (which is 1% of $1,000) instead of $9.90, which is 1% of $990.10.

It would be an error to record the debt (or asset) as $1,000 at the time of the receipt of the note, since it is worth only $990.10 today (assuming a 6% rate of interest). With the passage of time the value of the note will increase until it is worth $1,000 at maturity, but today it is worth less than $1,000. This assumes that a dollar today is more valuable than a dollar in the future. This is certainly a valid assumption as long as there is a positive rate of interest.

Example

Assume that a note of the same characteristics as the note in the preceding example is issued for merchandise. Record the receipt of the note and payment at maturity.

ABC COMPANY

Merchandise	$ 990.10	
Notes Payable		$ 990.10
To record issuance of a $1,000 noninterest-bearing 60-day note		
Notes Payable	990.10	
Interest Charges	9.90	
Bank		1,000.00
To record payment of the note and interest		

XYZ COMPANY

Notes Receivable	$ 990.10	
Sales		$ 990.10
To record the receipt of a $1,000 noninterest-bearing note		
Cash	1,000.00	
Notes Receivable		990.10
Interest Revenue		9.90

It would also be possible to record the note and show the maturity value of the note as well as the present value. This procedure makes use of contra accounts.

ABC COMPANY

Merchandise	$ 990.10	
Notes Payable, Discount	9.90	
Notes Payable		$1,000.00
Notes Payable	1,000.00	
Interest Charges	9.90	
Notes Payable, Discount		9.90
Bank		1,000.00

XYZ COMPANY

Notes Receivable	$1,000.00	
Notes Receivable, Discount		$ 9.90
Sales		990.10
Notes Receivable, Discount	9.90	
Cash	1,000.00	
Notes Receivable		1,000.00
Interest Revenue		9.90

This second procedure does not have any real advantage over the first procedure, although it also is correct.

Notes Discounted. Company A may take its own note to the bank and have it discounted, or it may take a note for which it is payee (Company X the maker) and discount it at the bank. The objective in both cases would be the raising of cash by Company A.

The bank computes the amount to be given to Company A, discounting the note by multiplying the maturity value of the note by the rate of interest (technically a discount rate) times the fraction of the year for which the note is being discounted.

Example

Compute the amount of discount for a 60-day note with a maturity amount of $1,500 if the *rate of discount* is 6%.

The bank will compute the amount of discount as follows:

$$\$1{,}500 \times 0.06 \times \frac{60}{360} = \$1{,}500 \times 0.01 = \$15$$

The company receiving the loan will receive $1,500 minus $15, or $1,485. It should be noted that paying $15 for the use of $1,485 for 60 days is paying a higher rate of *interest* than 6%.

The company borrowing the money may record the transaction in either of two ways:

Bank	$1,485	
Notes Payable		$1,485

or

Bank	$1,485	
Discount, Notes Payable	15	
Notes Payable		$1,500

Either procedure is correct, for the "Discount, Notes Payable" is a contra liability account. Unfortunately this account is in practice usually mislabeled "Prepaid Interest," and it finds its way over to the asset side of the position statement. This is unfortunate and incorrect reasoning. Nothing has been paid by the borrowing company and will not be paid until the note is due.

If the company is not discounting its own note but the note of another company, then the series of entries is somewhat different. The simplest procedure is to consider the collection from the bank as being equivalent to the collection from the maker and therefore crediting notes receivable. Usually there is interest revenue to be accrued from the moment of receiving the note to the time of discount. The bank discount may be greater than the interest revenue which would have been earned if the note had been held to maturity, in which case it is necessary to debit a "Discount Cost" account.

Example

Company A discounts a $1,000, 3%, 90-day note receivable of the XYZ Company dated October 1 at the bank on October 31. The bank discounts the note, using a discount rate of 6%. Make the entries on the books of Company A.

Oct.	1	Notes Receivable, XYZ Company	$1,000.00	
		Sales		$1,000.00
		To record the receipt of a note receivable and the sale		
	31	Interest Receivable	2.50	
		Interest Revenue		2.50
		To accrue interest for 30 days at 3%		
	31	Bank	997.42	
		Bank Discount Cost	5.08	
		Interest Receivable		2.50
		Notes Receivable, XYZ Company		1,000.00
		To record the discounting of the note at the bank		

The proceeds of the discounting (the debit to bank) are obtained by multiplying the maturity value of the note ($1,007.50) by (6% × $^{60}/_{360}$), and subtracting this product from the amount of the note ($1,007.50).[1] The bond discount cost is the difference between what was received from the bank ($997.42) and what was given up ($1,002.50). The bond discount cost is probably overstated, and this overstatement arises because the asset "Notes Receivable" was overstated. If the note had an interest rate of 3% and the best rate of discount which the bank would give was 6%, then probably the note at time of receipt would not be worth $1,000. However at the time of receipt its worth was equal to its maturity value ($1,007.50) discounted back 90 days, using the effective rate of interest for this type of loan. If the effective rate of interest at that time had been actually 6%, then both the receivable and the sales would have been overstated when they were recorded at $1,000. This type of problem is analogous to the problem encountered when the note did not have an explicit rate of interest.

The series of entries made to record the discounting of the note at the bank failed to note the fact that Company A is contingently liable to the bank until the note has been paid by the XYZ Company. This endorsement may be recorded in a footnote. An alternative procedure is to credit a "Notes Receivable, Discounted" account when the note is discounted. When the XYZ Company pays the bank, Company A will make the following entry:

---

[1] The note has 60 more days to maturity; thus the rate of discount (6%) is multiplied by $^{60}/_{360}$.

Notes Receivable, Discounted	$1,000	
Notes Receivable, XYZ Company		$1,000
To remove the asset and the contingent liability		

QUESTIONS AND PROBLEMS

16–1. The Jackson Company

On October 15 the Jackson Company received a 6%, 90-day, $1,000 note, dated October 15, from the Johnson Company as "payment" for a piece of equipment the Johnson Company had purchased. The note was paid when due.

The Jackson Company closes its books annually.

Required: Record the transactions in journal form.

16–2. The Johnson Company

Record the information given in Prob. 16–1 on the books of the Johnson Company.

16–3. The Judd Company

On December 16 the Judd Company sold a piece of equipment with a list price of $10,000 to the Jackson Company and accepted a noninterest-bearing note due in 90 days with a face amount of $10,000. The note was paid at maturity. Use 6% as the appropriate rate of *discount.*

Required

(a) Record the transactions from the point of view of the Judd Company, including the year-end adjustments.
(b) Record the transaction from the point of view of the Jackson Company.

16–4. The Judd Company (See Prob. 16–3.)

Assume that the Judd Company imediately discounted the note of December 16 at the bank. The bank used a 6% rate of *discount.*

Required: Record the transactions from the point of view of the Judd Company.

16–5. The Jameson Company

Oct. 1	Borrows $1,000 from the bank on a 60-day 6% note.
Oct. 16	Gives a note to the Jansen Company in exchange for an open account. The note matures in 30 days, bears a 4% rate of interest, and is for $500 plus interest.
Nov. 15	The note issued to the Jansen Company is paid.
Nov. 30	The note issued to the bank is paid.

Dec. 1	Merchandise is purchased, and a note given for the invoice amount of $1,500. The note has a 6% rate of interest and is due in 90 days.
Dec. 16	A note is accepted from a customer in exchange for an open account of $5,000. The note is a 6% note and is due in 30 days.
Dec. 31	A $1,000, noninterest-bearing, 90-day note is accepted from a customer for a sale made on December 31.

Required: Record the above transactions, including adjusting entries required on December 31.

16–6. The Johnson Company

On December 1 the Johnson Company borrowed $5,000 from the bank on a 60-day, 6% note. It made the following entry:

Dec. 1	Bank	$5,000	
	Notes Payable		$5,000

On December 31 the company closed its books and made the following entry:

Dec. 31	Interest Charges	$25	
	Interest Payable		$25

On January 1 of the next year the accountant made the following entry:

Jan. 1	Interest Payable	$25	
	Interest Charges		$25
	To reverse the entry made on December 31		

Required: What entry should be made by the Johnson Company when the note is paid?

16–7. The Jevons Company

The Jevons Company received a loan from the City National Bank. The maturity amount of the loan is $1,000, but the bank discounts the maturity amount, using a rate of discount of 6%. The note is dated March 31 and it is due in 120 days.

Required

(a) Record on the books of the Jevons Company the issuance of the note and the payment at maturity. The Jevons Company closes its books on June 30.

(b) Record on the bank's books the issuance of the note and payment at maturity. The bank closes its books on June 30.

17

Stockholders' Equity

Up to this point the stockholders' equity section of the position statement has consisted of two accounts. In this chapter the number of accounts and divisions will be increased, but there will remain a basic subdivision between contributed capital and capital arising through the retention of earnings. Many of the subdivisions of accounts in this chapter serve no managerial function but are merely an outgrowth of legal requirements and accounting conventions.

Preferred Stock. In an attempt to facilitate the raising of capital, a corporation will often issue preferred stock as well as common stock. The name "preferred stock" is used to describe stock of widely different characteristics but which has several basic differences from common stock. These are:

No voting privileges (though there are exceptions)
A fixed rate of return (the return is usually fixed in terms of the dollars per share to be paid; however the corporation may decide not to pay any dividends)
In case of liquidation the claims of preferred stockholders take precedence over those of common stockholders but are subordinate to the claims of all creditors

The preferred stock may also be "cumulative"; that is, if the dividend is passed over, then the accumulated preferred dividends have to be paid prior to the declaration of a common stock dividend. It may be "participating"; that is, after the common stock has received a certain amount of dividends, the preferred stockholders are again eligible for dividends. To determine the exact characteristics of preferred stock, it is necessary to review the specific contract of the issue being considered.

The equity of the preferred stockholders is classified in the stockholders' equity section of the position statement, although it should be separated from the common stock equity. The preferred stock will always have a par value which will determine the credit to the preferred stock account. If the amount contributed by the preferred stockholders is greater or less than par, then the difference should be recorded in a contra account or adjunct account.

Example

Record the journal entries for the following situations:

(a) One thousand shares of preferred stock, par $100, is issued for $100 per share.

Cash	$100,000	
Preferred Stock		$100,000

(b) Same situation but issued for $110 per share.

Cash	$110,000	
Preferred Stock		$100,000
Preferred Stock (amount paid in excess of par)		10,000

The "Preferred Stock, amount paid in excess of par" account is an adjunct account to preferred stock; in the position statement it should be added to "Preferred Stock."

(c) Same situation but issued for $92 per share.

Cash	$92,000	
Preferred Stock, Discount	8,000	
Preferred Stock		$100,000

The discount account is a contra to the "Preferred Stock"; in the position statement it should be subtracted from "Preferred Stock."

(d) A dividend of $5 per share is declared.

Preferred Stock Dividends	$5,000	
Dividends Payable		$5,000

The debit is to an income distribution account and the credit to a current liability.

Issue of Common Stock. The issue of common stock and preferred stock is usually preceded by the subscription of the stock by the prospective stockholders. This transaction may be recorded, or the corporation may wait until the cash is actually received before recording entries relative to the issuance of the stock. If the subscriptions are recorded, the following series of entries will be made for the subscription and issue of common stock:

Subscriptions Receivable	$100,000	
Common Stock, Subscribed		$100,000
To record the subscriptions for 10,000 shares at a price of $10 per share		

Subscriptions receivable may be treated as an asset, but because of the large risk of uncollectibility, it should not be classified as a current asset.

Cash	$100,000	
Subscriptions Receivable		$100,000
To record the collection of the subscriptions		
Common Stock, Subscribed	100,000	
Common Stock, Outstanding		100,000
To record the issuance of the common stock		

Common stock may or may not have a par or stated value. The reasons why common stock should have a par value are related to the legal requirements of the various states and the par value is the basis of taxing the issuance and exchange of stock. The accounting entries to record the issuance of common stock are more likely to be dictated by the legal requirements than by good accounting theory. Thus, instead of using one account to record the contribution of stockholders, we must use two accounts, one to record the par of stated value, and the other to record the difference between issue price and par, or stated value, of the stock. The danger in recording this transaction is that the amount paid in excess of par has a tendency to appear on financial statements as "surplus." This is misleading, since it may indicate to some that a firm is operating profitably even though it may be just beginning operations.

Example

Record the journal entries for the following situations:

(a) One thousand shares of common stock, par $10, are issued for $11 per share.

Cash	$11,000	
Common Stock, Par		$10,000
Common Stock, Amount Paid in Excess of Par		1,000

(b) One thousand shares of common stock, par $10, are issued for $9 per share.

Cash	$9,000	
Common Stock, Discount	1,000	
Common Stock, Par		$10,000

"Common Stock, Discount" is a contra account to "Common Stock, Par."

(c) One thousand shares of common stock, *no par,* are issued for $9 per share.

Cash	$9,000	
Common Stock		$9,000

Acquisition of Assets. Common stock may be issued for assets other than cash; for example, land, buildings and patents. It is the task of the accountant to ensure that the asset is correctly valued, that the entry recording the stockholders' contribution to the corporation is based on a realistic valuation of the assets contributed and that the entry is *not* based on the par value of the stock. If the assets are given to the corporation without there being an issuance of stock, then the credit should be recorded as donated capital and should be actually part of the stockholders' equity. Here again the main problem is to determine the real value of the assets contributed.

Building	$10,000	
Land	4,000	
Donated Capital		$14,000
To record the gift of land and building to the firm by the city of Able; both land and building are recorded at current values		

It is important to distinguish donated capital from retained earnings. The retained earnings account should only be used to record the past earnings which have been retained for use in the enterprise. For this same reason capital arising from the adjusting of fixed assets to conform to current appraisal values should not be recorded to retained earnings. This situation is treated in greater detail in Chapter 36.

Treasury Stock. When a corporation purchases its own stock, the transaction is often recorded in the following manner:

Treasury Stock	$10,000	
Bank		$10,000
To record the purchase of 500 shares of common stock for $10,000		

The treasury stock account is then treated as a subtraction from the total of the other stock equity accounts (or is improperly treated as an asset). When a company purchases its own stock, it is retiring that stock, even though from a legal point of view a share of stock once issued has different characteristics than a share of stock not previously issued; (for example, it may be issued at a price less than par without the purchaser being assessable for the difference between par and the purchase price). The foregoing entry to record the purchase of stock is not incorrect if the treasury stock account is treated as a contra stock equity account; but it easily leads to incorrect entries if the stock is reissued. Assume that the stock in the example is reissued for $15,000.

Cash	$15,000	
Treasury Stock		$10,000
Gain from Sale of Treasury Stock		5,000

This procedure leads to the unfortunate conclusion that there is a gain resulting from the issuance of shares of common stock. This is an erroneous interpretation. To avoid this series of entries, the following procedure should be followed when shares of the company's own stock are purchased:

1. Credit bank or cash.
2. Debit the common stock account for the par or stated value (or a proportionate amount of the account; for example, 1% of the balance if 1% of the stock is purchased).
3. Debit the "Amount Paid in Excess of Par Value" for a proportionate amount. If 1% of the stock is purchased, then this account should be debited for 1% of its balance *unless* a lesser amount is needed to balance the entry.
4. Debit the retained earnings account for the amount necessary to balance the entry.
5. If the stock is reissued, then record the transaction as if it were the issuance of stock which had never been issued.

Example

The corporation purchases 500 shares of its own common stock (par $10) for $10,000. There are 50,000 shares outstanding. Relevant account balances before the recording of the transaction were:

Common Stock: $500,000
Common Stock: Amount paid in excess of par, $50,000
Retained Earnings: $120,000

Record the purchase of the stock for $20 per share and the subsequent issuance of the stock for $30 per share.

Common Stock	$ 5,000	
Common Stock, Amount Paid in Excess of Par	500	
Retained Earnings	4,500	
Bank		$10,000

To record the purchase of 1% of the outstanding shares, 500 shares of common stock, for $10,000; the common stock is debited for $5,000, or $10 × 500; the amount in excess of par is debited for $500, or $1 per share

Cash	15,000	
Common Stock		5,000
Common Stock, Amount Paid in Excess of Par		10,000
To record the issuance of 500 shares of stock for $30 per share; common stock is credited for par value, $10, times the number of shares, 500		

There is a temptation to say that the corporation made a gain of $5,000 speculating in its own stock. Would there have been a gain if the company had issued 500 shares of stock which had not previously been issued? In this case there would be no question but that a gain was *not* made. The question does arise, however, when the company purchases its own stock, since it is difficult to realize that if Company A purchases its own common stock, it is a transaction of a different nature than if it had purchased the stock of another company.

Treasury Stock—Legal Complications. In many states corporations must restrict an amount of retained earnings when they purchase shares of their own stock. The following entries are used:

Treasury Stock	$10,000	
Bank		$10,000
To record the purchase of treasury stock		
Retained Earnings	10,000	
Retained Earnings, Restricted because of Purchase of Treasury Stock		10,000
To restrict a portion of retained earnings in conformance with legal requirements		

The second entry is designed to limit dividend or other distributions. It may or may not accomplish this end, its success depending on whether dividends are currently being determined by the amount of cash on hand or by the level of retained earnings. From a strict accounting point of view, the above entries can be improved. The purchase by a corporation of its own shares should be viewed as a reduction of common stock outstanding, a reduction in the account "Amount Paid in Excess of Par," and in some cases, a reduction in retained earnings. This procedure eliminates to some extent the necessity for an entry restricting retained earnings, since the appropriate stock equity accounts have already been reduced. On the other hand the rights of the creditors are safeguarded somewhat by the restricting of the retained earnings, since the amount of capital which may be distributed to the stockholders is limited by the reduction of retained earnings.

Dividends. Dividends on stock are accompanied by a disbursement of corporation assets and are correctly interpreted as distributions of income. Stock dividends arise when the company, instead of distributing company assets, merely issues more shares of stock. Thus, if you held 100 shares of common stock and a 10% stock dividend was declared, you would have 110 shares after the dividend had been delivered. However, if you owned 1% of the company (1% of the stock) before the stock dividend, you would own 1% of the company (1% of the stock) after the dividend. It is true that you could sell 10 shares and still own 100 shares, but you would have sold a portion of your equity. You could have accomplished the same end before the dividend by selling a portion of your holdings.

The conclusion must be that a stock dividend has little significance, but that it can be recorded to conform to legal requirements by making the following journal entry:

Retained Earnings	xxxx	
Common Stock		xxxx

There is a problem in deciding the amount of retained earnings which should be capitalized (taken out of retained earnings and placed into capital stock). The general practice is to use the market value. Thus, if a stock dividend of 1,000 shares is declared and the market price of the stock is $6 per share, the following entry will be made:

Retained Earnings	$6,000	
Common Stock		$6,000

If the common stock has a par value, it will be necessary to credit the amount of the market price in excess of par to the account "Common Stock, Amount Paid in Excess of Par."

Some accountants prefer to capitalize an amount equal to the par value of the stock, and there has been considerable discussion as to whether par value or market value should be used. The amount selected will effectively limit the amount of retained earnings which may be distributed as cash dividends, and therefore the question is of some importance.

Retained Earnings—Reserves. It is not unusual to find that the retained earnings account has been debited and various reserve accounts credited. The result of this procedure is to scatter retained earnings throughout the equity side of the position statement and to hide retained earnings under various titles. This procedure should be avoided, for it accomplishes nothing more than creating confusion. It serves no function to identify a portion of retained earnings with a specific purpose, since such identification tends to imply that the remainder is not being used profitably. The simplest procedure is to eliminate all retained earnings reserves and to indicate somewhere in the annual report how the assets financed through retained earnings and other sources are being used.

Among the retained earnings reserves found in position statements are:

Reserve for Contingencies (the event has not occurred)
Reserve for Self-Insurance
Reserve for Possible Price Decline of Inventory
Reserve for Replacement of Plant
Reserve for Bond Sinking Fund

There are also "secret reserves" which directly understate retained earnings. Most commonly these are found in overstatements of asset valuation accounts (for example, excessive allowances for depreciation or allowances for uncollectable accounts). They are also found in the overstatement of a liability account or an understatement of an asset account. When the secret reserves are discovered, they should be eliminated. The function of accounting is to act as a means of communicating, not of hiding, information.

Stockholders' Equity Section of the Position Statement. The stockholders' equity section of the position statement generally leads off with preferred stock, then the explicit contribution of the common stockholders, and finally the retained earnings. Any contra or adjunct accounts should be placed immediately under the primary account which they adjust. For example, discount on preferred stock should be a subtraction immediately below the preferred stock par amount.

Special items such as donated capital, or reserves which are truly retained earnings, may be placed toward the bottom of the section.

Illustration

Arrange the following items as they might appear on a position statement:

Common Stock, Par Value $10 (10,000 shares outstanding)	$100,000
Common Stock, Amount Paid in Excess of Par	7,000
Preferred Stock, Par $50 (1,000 shares outstanding)	50,000
Preferred Stock, Discount	(4,000)
Retained Earnings	39,000
Donated Capital	10,000

The following represents the stockholders' equity section of a position statement:

Stockholders' Equity

Preferred Stock, 1,000 shares of par $50 stock outstanding		$ 50,000	
Less Discount on Preferred Stock		4,000	
Preferred Stock Equity			$ 46,000
Common Stock, 10,000 shares of par $10 stock outstanding	$100,000		
Common Stock, Amount Paid in Excess of Par	7,000	$107,000	
Retained Earnings		39,000	
Donated Capital		10,000	
Common Stock Equity			156,000
Total Stockholders' Equity			$202,000

Reorganizations and Mergers. If a corporation is reorganized, there is the problem of whether to carry forward the balance in the retained earnings account. This is particularly relevant if there is a debit balance in the account indicating unprofitable operations in the past. If the company has been completely reorganized, the management changed, and new shares of stock issued, then there will be little objection to the new company starting out without the burden of a recorded deficit. The deficit should be eliminated by entries first to the account "Amount Paid in Excess of Par Value" and then to the common stock account. This may be accompanied by a reduction in the par value of the stock. In no case should retained earnings be created by the reduction of the par value of the stock. The creation of retained earnings in this manner should not be allowed even if there has been a true reorganization and not just an attempt to eliminate a deficit.

Example

The ABC Company is being reorganized. The account balances are as follows:

Common Stock	$100,000
Common Stock, Amount Paid in Excess of Par	20,000
Retained Earnings (debit balance)	15,000

It is decided to issue no par stock to the present stockholders and to eliminate the deficit. Record the journal entries.

Common Stock, Par	$100,000	
Common Stock, Amount Paid in Excess of Par	20,000	
Retained Earnings (deficit)		$ 15,000
Common Stock, No Par		105,000

Mergers should be distinguished from acquisitions. If Company A (a large corporation) acquires Company Z (a small corporation), then the retained earnings of Company Z should not be recorded on the books of Company A. The transaction should be treated as an acquisition of assets, not the merger of two corporate entities. If two firms of comparable size merge, then the retained earnings of the two companies may be added to show the retained earnings of the new corporation. An alternative treatment would be to consider that the two old corporations cease to exist and that a new corporate entity is created; thus the retained earnings balance of the new corporation is zero. This latter treatment is theoretically sound, but it is less likely to be found than the treatment which continues to record the retained earnings of one or both corporations.

Example

COMPANY A		COMPANY X	
Assets	$10,000	Assets	$5,000
Common Stock	$ 4,000	Common Stock	$3,000
Retained Earnings	6,000	Retained Earnings	2,000
	$10,000		$5,000

Record the acquisition of Company X by Company A, assuming that it is treated as:

(a) An acquisition of assets.
(b) A merger, with the retained earnings of both companies shown.
(c) A merger with the new company considered as a new corporate entity.

Company A gave Company X stockholders 100 shares of no par stock for the assets of Company X.

(a)	Misc. Asset Accounts	$ 5,000	
	Common Stock		$ 5,000
	This entry assumes that the assets are worth $5,000; recorded on the books of Company A.		
(b)	Misc. Asset Accounts	5,000	
	Common Stock		3,000
	Retained Earnings		2,000
	This entry also assumes that the assets are worth $5,000; recorded on the books of Company A.		
(c)	Misc. Asset Accounts	15,000	
	Common Stock		15,000
	To set up the accounts of the new corporate entity; no retained earnings are recorded because the company is considered to be without previous operating experience.		

Which of the given procedures is the best? The answer must depend on the facts of the individual situation, but in general the retained earnings of the acquired corporation should not be taken up on the books of the surviving corporation because this is inconsistent with the "entity" convention.

Retained Earnings. The presence of retained earnings does not mean that there is an equal amount of cash on the asset side of the position statement. Retained earnings represent a portion of the stockholders' share in the total assets. There may or may not be a penny of cash. The retained earnings cannot be identified with a specific asset or group of assets.

Example

ABZ COMPANY
POSITION STATEMENT
AS OF DECEMBER 31, 1956

Cash	$10,000	Capital Stock	$ 6,000
		Retained Earnings	4,000
	$10,000		$10,000

In the foregoing position statement the cash is actually greater than the retained earnings. If the company then buys $10,000 of fixed assets, the position statement becomes:

Cash	$ ——	Capital Stock	$ 6,000
Fixed Assets	10,000	Retained Earnings	4,000
	$10,000		$10,000

The retained earnings are unchanged, but they are $4,000 greater than the cash balance, which is now zero.

Recording the Stockholders' Equity—Decision-making. Historically, accountants have attempted to distinguish between the stockholders' explicitly contributed capital (where there has been an issue of stock) and capital generated from retained earnings (contributed capital that does not require an explicit decision by the individual stockholders). This distinction serves several purposes. It indicates to some extent the past profitability of the corporation, although this indication is confused by cash dividends, stock dividends, reorganizations (real and quasi), secret reserves, disclosed reserves, mergers, and spin-offs (the opposite of mergers). The second purpose behind the distinction is somewhat easier to accomplish. It is the fulfillment of legal requirements requiring a separation of contributed capital and retained earnings. The main functions of this latter requirement is to safeguard the rights of the creditors and to prevent the declaration of dividends when the declaration will endanger the ability of the creditors to collect.

As stated before, we must know the amount of retained earnings in order to know if a dividend can be legally declared (though in special cases dividends can be declared even though the retained earnings are zero or negative; for example, liquidating dividends). Somewhat analogous to the legal requirement are the requirements written into bond contracts which specify that a certain balance of retained earnings cannot be available for dividends. This is tackling the problem through the back door (since dividends are paid and debts are retired with cash), but in certain cases these restrictions may effectively limit the amount of dividends which can be paid.

Are there other managerial decisions which rely on the classification of accounts in the common stockholders' equity section? The answer is "no." From a managerial point of view the various distinctions between "Common Stock," "Amount Paid in Excess of Par," "Retained Earnings," etc., are of little value; in fact they may be harmful because they add to the confusion concerning accounting.

QUESTIONS AND PROBLEMS

17–1. The Liberty Company

The Liberty Company was organized on January 2, 1956, with stock authorized as follows:

	Number of Shares	*Par*
4% Preferred Stock (cumulative, nonparticipating) .	100,000	$100
Common Stock	1,000,000	20

The following transactions took place during the years 1956 and 1957.

1956	
Feb. 1	Issued 500,000 shares of common stock at a price of $22 per share.
Apr. 1	Issued 40,000 shares of preferred stock at a price of $105 per share, the shares to bear dividends starting April 1.
July 1	Dividend of $1 per share declared and paid to holders of the preferred stock.
Aug. 15	Issued 100,000 shares of common stock at a price of $25 per share.
Aug. 16	Issued 10,000 shares of common stock for land, building, and equipment owned by a Mr. R.F. Jones. Mr. Jones also received $50,000 cash. The land has an appraised value of $80,000.
Aug. 31	The company received a gift of land from the city of Irvington. The land is to be used as a parking lot adjacent to the

property obtained from Mr. Jones. The land has an appraised value of $40,000.

Dec. 31 The company's operations for the year were profitable. There was a profit of $300,000 (debit miscellaneous assets). Despite the profitable operations the board of directors decided not to declare dividends on either the preferred or common stock.

1957

May 12 The board of directors decided to begin a bonus plan for executives. In view of this decision it was decided to purchase some of the outstanding common stock, which was to be given to executives as a bonus.

May 15 The company acquired 1,000 shares of common stock at an average price of $22 per share. State law requires a restriction of retained earnings when common stock is acquired.

June 30 One-half of the 1,000 shares of stock acquired on May 15 were reissued at a price of $28 per share.

July 1 Dividends of $4 per share are declared and paid on the preferred stock. This covers the period July 1, 1956, to July 1, 1957.

Dec. 15 Dividends of $1 per share are declared on the common stock, payable on January 15, 1958. The regular dividend on the preferred stock is declared, payable on December 31, 1957.

Dec. 31 The preferred stock dividend is paid. The operations for the year resulted in a profit of $1,200,000 (debit Miscellaneous assets).

Required: Record the above transactions in journal form.

17–2. The Quasi Corporation has been operating for a period of years, and during the period 1945–56 incurred a large operating deficit. Despite this fact the cash position of the firm was good, since the management had reduced the scope of the company's operations. In view of these facts the board of directors is considering resuming cash dividends. The operations during 1957 have been profitable, and orders on hand indicate a profitable 1958.

The stockholders' equity section includes the following accounts:

	Balance Dec. 31, 1957
Common Stock, Par $20	$20,000,000
Common Stock, Amount Paid in Excess of Par	5,000,000
Retained Earnings (debit balance)	9,000,000

It is decided to issue no par stock to the present stockholders and to eliminate the deficit. The following journal entry was made on December 31, 1957.

Common Stock	$20,000,000	
Common Stock, Amount in Excess of Par	5,000,000	
Common Stock, No Par		$15,000,000
Retained Earnings		10,000,000

Required: Comment on the procedure followed. Prepare an adjusting entry if you think one is required. Explain any entries you make.

17–3. In 1956 the Octopus Corporation acquired 100% ownership of the Smith Corporation by issuing 200,000 shares of common stock. At the time of acquisition the position statements of the two corporations were as follows:

	THE OCTOPUS CORPORATION	THE SMITH CORPORATION
Assets	$100,000,000	$20,000,000
Liabilities	$ 60,000,000	$ 1,000,000
Common Stock	25,000,000	4,000,000
Retained Earnings	15,000,000	15,000,000
	$100,000,000	$20,000,000

Required

(a) Prepare journal entries to record the acquisition assuming the Smith Corporation ceases to exist as a separate corporate entity.

(b) Show the position statement of the Octopus Corporation after the acquisition.

17–4. In 1957 the Octopus Corporation acquired the Magnum Corporation by issuing 1,000,000 shares of stock. The Octopus Corporation has varied operations. The Magnum Corporation has operated entirely in the movie industry. At the time of acquisition the position statements of the two corporations were as follows:

	THE OCTOPUS CORPORATION	THE MAGNUM CORPORATION
Assets	$160,000,000	$150,000,000
Liabilities	$ 90,000,000	$ 50,000,000
Common Stock	54,000,000	40,000,000
Retained Earnings	16,000,000	60,000,000
	$160,000,000	$150,000,000

Required

(a) Prepare journal entries to record the acquisition. Briefly explain the entries.

(b) Show the position statement of the Octopus Corporation after the acquisition.

17–5. The Carter Company

The Carter Company was organized on January 2, 1956, with stock authorized as follows:

	Number of Shares	*Par*
4% Preferred Stock (cumulative, nonparticipating)	100,000	$100
Common Stock	1,000,000	10

The following transactions took place during the years 1956 and 1957:

1956	
Feb. 1	Issued 400,000 shares of common stock at a price of $12 per share.
Apr. 1	Issued 40,000 shares of preferred stock at a price of $110 per share.
July 1	Dividend of $1 per share declared payable to holders of the preferred stock.
July 10	Paid the dividend declared on July 1.
Aug. 18	Issued 100,000 shares of common stock at a price of $15 per share.
1957	
Sept. 15	The Company acquired 10,000 shares of common stock at an average price of $12 per share. State law requires a restriction of retained earnings when common stock is acquired.
Oct. 1	The Company issues 2,000 shares of the stock acquired on September 15 at a price of $16 per share.

Required: Using journal entries, record the above transactions.

17–6. The common stockholders' equity of a corporation is equal to the sum of the accounts recording the capital received from stockholders, the retained earnings, and various miscellaneous stockholders' equity items such as "Surplus Arising from Appraisal" or "Donated Capital." The common stockholders' equity is also equal to the total assets minus total liabilities and the preferred stockholders' equity. Despite the fact that these equalities are valid, it is frequently impossible to take a statement of financial position as prepared by the accountant and to compute a significant figure to represent the equity of the common stockholders.

Required: Explain the last sentence of the problem.

17–7. The position statement of the Dupy Corporation shows a retained earnings balance of $3,500,000. An analysis of the account revealed the following:

Analysis of Retained Earnings

Arising from past earnings	$2,500,000
Donation of land by the city	600,000
Amount paid in excess of par value of preferred stock	100,000
Gain on sale of treasury stock	180,000
Amount paid in excess of par value of common stock	120,000
	$3,500,000

Required: Comment on the amount shown as retained earnings.

17–8. Explain why it is possible for a corporation to have retained earnings of several million dollars while not being able to expand plant facilities by one million dollars without raising additional capital.

18

Compound Interest, Annuities, and Related Accounting Problems

MONEY HAS VALUE. This is a familiar statement with which few people would argue. To have $5 may be good, but to have $10 is better. The problem of comparing the relative desirability of having $5 or $10 would be complicated, however, if the choice were between:

1. Having $5 today, or
2. Having $10 ten years from today.

Which is the better choice? Obviously there is no one answer to the alternatives as stated. To some people having $5 today is worth more than the prospect of having $10 ten years from today. If on the other hand you have no pressing need for the money now, the prospect of twice as much money in the future may be more desirable. How can this decision be solved scientifically? The problem cannot be solved with certainty in all cases, but in the majority of cases a cost or value of money may be assumed. This cost is expressed as a rate of interest. If the rate of interest is known, the present value of $10 due ten years from today may be computed by making use of a formula. Comparing the present value of the $10 with the $5 which may be received today gives the answer as to which is the more desirable alternative. Change the rate of interest, or the number of periods, and the answer may be different.

There are four types of problems that are basic to the study of compound interest (compound interest refers to the procedure of computing interest on *interest and principal*):

1. The present value of a dollar or a sum of money due at the end of a period of time. *Example:* What is the amount owed now, if you have to pay $1,000 in four years?

2. The future value of a sum of money. *Example:* If you deposit \$1,000 today, what will be the worth of your bank account in four years?
3. The present value of a series of *equal* payments due at the end of each period. *Example:* Your annuity promises to pay you \$1,000 a year for ten years. How much is the annuity worth today?
4. The future value of a series of equal payments to be paid at the end of each period. *Example:* If you deposit \$1,000 a year for ten years, how much will you have at the end of the ten-year period?

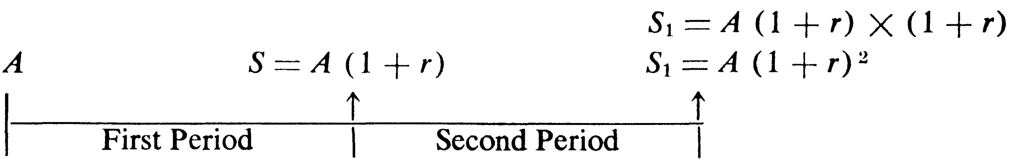
The remainder of this chapter is devoted to evolving general formulas and solving problems like the four types given here. Mathematical formulas are used, but the mathematics is all of a low level of difficulty. While all the problem types enumerated may be solved by the use of tables (if tables are available), the correct application of the tables is somewhat more ensured if the person solving the problem has a working knowledge of the mathematics on which the tables were based.

Future Worth of a Sum of Money. If you have a sum of money, A, today, how much will you have at the end of one interest period if the rate of interest is r? At the end of one period you will have the original amount, A, plus the interest earned on A. If the amount to which A has accumulated is designated by S, then

$$S = A + Ar$$
$$S = A\ (1 + r)$$

The factor $(1 + r)$ is called the *accumulation factor.* If the value of S at the end of the second period is desired, then S or $A(1 + r)$ must be accumulated for one more period. This is accomplished by multiplying the "amount" S by $(1 + r)$, the accumulation factor. Let S_1 equal the amount of A accumulated for two periods; then

$$S_1 = A\ (1 + r) \times (1 + r) = A\ (1 + r)^2$$



To find the amount S of a sum of money A for one period, the accumulation factor was raised to the first power; to find the amount S_1 of a sum of money A for two periods, the accumulation factor was raised to the second power. This analysis, carried far enough, will lead to the general equation for finding the amount of a sum of money:

I $$S = A\ (1 + r)^n$$

Where S = the future worth of a sum of money A.

A = the sum of money which will accumulate to a value of S.

r = the rate of interest.

n = the number of periods.

If A is equal to \$1, then the equation becomes

II $$S = (1 + r)^n$$

S in this equation is the future worth of *\$1* compounded at r rate of interest for n periods. S can be found in tables or can be computed.

If instead of \$1 the sum being accumulated is A, then it is necessary to multiply the future worth of \$1 by A. This is Equation I:

$$S = A\,(1 + r)^n$$

The future worth of A dollars can be expressed in a line diagram as follows:

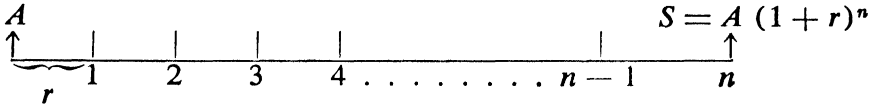


TABLE 18–1

$S = (1 + r)^n$
The Future Worth of a Dollar

n/r	3%	3½%	4%
1	1.0300	1.0350	1.0400
2	1.0609	1.0712	1.0816
3	1.0927	1.1087	1.1249
4	1.1255	1.1475	1.1699

Note that as n increases, with r constant, S increases, and that as r increases, with n constant, S increases. The longer the period or the higher the interest rate, the greater the amount accumulated.

Examples

(a) Find the accumulated value of \$1 at the end of 4 years if interest is earned at the rate of 4%.

Answer: $S = 1.04^4 =$ \$1.1699.

(b) Find the accumulated value of \$1 at the end of 2 years if interest is compounded semi-annually and if interest is earned at the rate of 3% every half-year.

Answer: $S = 1.03^4 =$ \$1.1255. (Note that n is equal to 4, the number of times the interest is compounded.)

(c) If Mr. Johns deposits \$100 in a bank which is paying 3.5% interest compounded annually, how much will he have at the end of 4 years?

Answer: $S = \$100\ (1.035)^4 = \$100\ (1.1475) = \$114.75$.

(d) What is the interest I earned in Probs. (a), (b), and (c)?
1. Interest is \$ 0.1699.
2. Interest is \$ 0.1255.
3. Interest is \$14.75.

(e) In terms of S and A, to what is I equal?

Answer: $I = S - A$; if A is \$1, then $I = S - 1$.

Present Worth of a Sum of Money. The preceding section developed the tools for computing the future worth of a sum of money (\$1 deposited will accumulate to how much in n periods at r rate of interest?). In terms of the equation used, the unknown was S, with A, r, and n known.

This section is concerned with the problem of computing how much has to be deposited in order to have \$1 (or S dollars) in n periods at r rate of interest. We know the values of S, r, and n, and are interested in finding the unknown A. We do this by using Equation I.

$$S = A\ (1 + r)^n$$

Dividing both sides by $(1 + r)^n$,

III
$$A = \frac{S}{(1 + r)^n} = S\ (1 + r)^{-n}$$

Equation III is the general equation for present worth of S dollars. If $S = \$1$, then Equation III becomes

IV
$$A = (1 + r)^{-n}$$

In Equation IV, A equals the present value of \$1 discounted at r rate of interest for n periods. A is also the amount that has to be deposited in order to have \$1 after n periods if the rate of interest is r.

The present worth of S dollars may be expressed in a line diagram as follows:

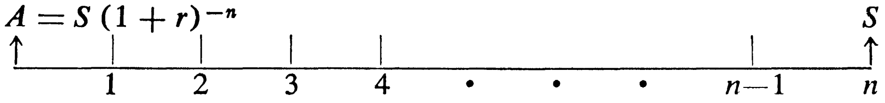


TABLE 18–2

$A = (1 + r)^{-n}$
Present Value of a Dollar

n/r	3%	3½%	4%
1	0.9709	0.9662	0.9615
2	.9426	.9335	.9246
3	.9151	.9019	.8890
4	.8885	.8714	.8548

Note that A decreases as n increases, with r constant, and that A decreases as r increases, with n constant; in other words, the present value of a given amount will be less the longer the time period and the higher the rate of interest.

Examples

(a) What sum of money must be invested now at 3% so that \$1 will be available at the end of 4 years?

Answer: $A = (1 + 0.03)^{-4} = 1.03^{-4} = \$0.8885$.

(b) What is the present value of \$1 due in 3 years if the interest rate is 3½%?

Answer: $A = (1 + 0.035)^{-3} = 1.035^{-3} = \$0.9019$.

(c) Mr. A. promises to pay you \$8,000 for a used truck 2 years from now. The interest rate is 4%. How much is that promise worth now? (Assume that there is no risk that A will not pay, and that he signs a note.)

Answer:
$$\begin{aligned} A &= S(1 + r)^{-n};\ S = \$8{,}000;\ r = .04;\ n = 2 \\ A &= \$8{,}000\ (1 + 0.04)^{-2} = \$8{,}000\ (1.04)^{-2} \\ &= \$8{,}000 \times 0.9246 = \$7{,}396.80 \end{aligned}$$

(d) In Prob. (c), what is the amount of discount? What is the general equation for the amount of discount?

Answer: \$603.20; obtained by subtracting \$7,396.80 from \$8,000.00.
Answer: $D = S - A$ or $D = 1 - A$ if $S = \$1.00$.

(e) What is the journal entry for the transaction described in Prob. (c)?

Answer:

Notes Receivable	\$7,396.80	
Sales		\$7,396.80

(f) If \$1 is invested at 3%, how much will have accumulated at the end of 4 years? (Use Table 18–2.)

Answer:
$$\begin{aligned} S &= (1 + 0.03)^4 = \frac{1}{1.03^{-4}} = \frac{1}{0.8885} \\ &= \$1.1255 \text{ (Use Table 18–1 as a check.)} \end{aligned}$$

Annuities. Another very important subject in the mathematics of business is the subject of annuities. The terminology unfortunately adds to the confusion surrounding this subject. The reader should be aware that the same terminology is not used by all accountants.

The word "annuity" is used to describe a series of *equal* payments, made at *regular* intervals of time. The period of time between payments is called the *payment period.* The period of time between computations of interest is called the *interest-conversion* period. When the payment period is equal to the interest-conversion period, the annuity is called an *ordinary annuity.* Only ordinary annuities will be covered in this chapter in order to avoid unnecessary complications.

Future Worth of an Annuity. An immediate annuity (or annuity in arrears) is defined as a series of equal payments called *rents,* spread over equal periods of time. The first payment is due one period from the start of the annuity and the last payment is due at the end of the annuity. Pictorially this may be presented as follows:

Amount	\$0	\$50	\$50	\$50
Pay. Date	1/1/56	1/1/57	1/1/58	1/1/59

If we deposit \$50 in the bank on January 1, 1957, 1958, 1959, the present date being January 1, 1956, then, by definition, this is an immediate annuity. There are equal payments (\$50.00), an equal period between payments (1 year), the first payment was one period from January 1, 1956, and the last payment coincident with end of the annuity. How much money will we have in the bank on January 1, 1959, if the interest rate is 3%? We simplify the problem by assuming that the deposits are \$1.00 each. We can represent this as follows:

Amount	\$0	\$1	\$1	\$1
Pay. Date	1/1/56	1/1/57	1/1/58	1/1/59

On January 1, 1957, we shall have \$1.00 in the bank, the dollar we have just deposited. On January 1, 1958, we shall have the dollar deposited that day plus the dollar deposited last year together with the interest earned during 1957, or $1 + (1 + 0.03)^1$. On January 1, 1959, we shall have the dollar deposited that day, the dollar deposited on January 1, 1958 together with 1 year's interest, and the dollar deposited on January 1, 1957, together with 2 years' interest, or $1 + (1 + 0.03)^1 + (1 + 0.03)^2$. If we were to develop this example for any number of years, we would have a geometric series $(1 + r)^0 + (1 + r)^1 + (1 + r)^2 \cdots (1 + r)^{n-1}$. This geometric series may be expressed as

V

$$S_{\overline{n|}\,r} = \frac{(1 + r)^n - 1}{r}$$

where $S_{\overline{n|}\,r}$ is the *amount* of an annuity, the rent \$1, the number of periods is *n,* and the effective rate of interest is *r.*

Above we developed the equation

$$I = S - A$$

in which I = interest.
S = amount of a sum of money.
A = the original amount.

If A equals 1, then by definition S equals $(1 + r)^n$. Substituting in the equation $I = S - A$, we obtain Equation VI.

VI $$I = (1 + r)^n - 1$$

Equation VI is equal to the numerator of the right-hand side of Equation V and may be substituted into that equation to obtain the very useful Equation VII.

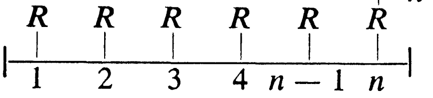
VII $$S_{\overline{n|}\,r} = \frac{I}{r}$$

If the rent is other than \$1, Equation V becomes

VIII $$RS_{\overline{n|}\,r} = R \times \frac{(1 + r)^n - 1}{r} \quad \text{or} \quad R \cdot \frac{I}{r}$$

This can be expressed in a line diagram as follows:

$$RS_{\overline{n|}\,r} = R \times \frac{(1 + r)^n - 1}{r}$$



Thus, if we know the interest rate r, the number of periods n, and the rent R, the future worth of the annuity can be calculated. In fact, if we are given any three of the four unknowns, the fourth can be calculated. Tables can also be used, if available.

TABLE 18–3

$$S_{\overline{n|}\,r} = \frac{(1 + r)^n - 1}{r}$$

Future Worth of an Annuity of \$1

n/r	3%	3½%	4%
1	1.00000	1.00000	1.00000
5	5.30914	5.36247	5.41632
10	11.46388	11.73139	12.00611

Example

(a) If we deposit \$500 each year, starting 1 year from now, how much shall we have at the end of 10 years? The interest rate is 3%. Given

$$\begin{aligned} R &= \$500 \\ n &= 10 \\ r &= 3\% \end{aligned}$$

Then

$$\begin{aligned} RS_{\overline{n|}\,r} &= R\,\frac{(1+r)^n - 1}{r} \\ RS_{\overline{n|}\,r} &= 500\left(\frac{1.03^{10} - 1}{0.03}\right) \\ &= 500\left(\frac{1.3439164 - 1}{0.03}\right) \\ &= 500\left(\frac{0.3439164}{0.03}\right) \\ &= 500\ (\$11.46388) \\ &= \$5{,}731.94 \end{aligned}$$

An easier solution would make use of the tables for the values of

$$\frac{(1+r)^n - 1}{r}$$

(see Table 18–3).

$$\begin{aligned} S_{\overline{10|}\,3\%} &= \$11.46388 \\ RS_{\overline{n|}\,r} &= \$500\ (\$11.46388) \\ &= \$5{,}731.94 \end{aligned}$$

(b) If 10 years from now we want \$5,731.94, how much shall we have to deposit at the end of each year? The interest rate is 3%.

$$\begin{aligned} RS_{\overline{n|}\,r} &= \$5{,}731.94 \\ R &= \frac{\$5{,}731.94}{S_{\overline{10|}\,3\%}} \\ R &= \frac{\$5{,}731.94}{11.46388} \\ &= \$500\ (\text{yearly deposit}) \end{aligned}$$

Present Worth of an Annuity. How much would we pay for an annuity of a given number of payments of a given amount if the rate of interest is r? The equation for the present worth of an annuity of \$1 per period is

IX $$A_{\overline{n|}\,r} = \frac{1-(1+r)^{-n}}{r}$$

In a preceding section we developed the equation

$$D = S - \mathrm{A} \quad \text{or} \quad D = 1 - A$$

If the amount being accumulated is \$1 and we apply Equation IV, $A = (1+r)^{-n}$, then

$$D = 1 - (1+r)^{-n} \tag{X}$$

Equation X is the numerator of the right-hand side of Equation IX and may be substituted into that equation to obtain the very useful equation XI. Note that r is the effective rate of interest.

$$A_{\overline{n}|r} = \frac{D}{r} \tag{XI}$$

If the rent is other than \$1, Equation IX becomes

$$RA_{\overline{n}|r} = R \times \frac{1-(1+r)^{-n}}{r} \tag{XII}$$

If we are given any three of the four unknowns, the fourth can be calculated or can be obtained from tables.

TABLE 18–4

$$A_{\overline{n}|r} = \frac{1-(1+r)^{-n}}{r}$$

Present Value of an Annuity of \$1

n/r	3%	3½%	4%
1	0.97087	0.96618	0.96154
9	7.78611	7.60769	7.43533
13	10.63496	10.30274	9.98565

Examples

(a) How much would you be willing to pay now for nine payments of \$1,000, the first payment to begin 1 year from now? The rate of interest is 3%. (Use Table 18–4.)

$$\begin{aligned} RA_{\overline{n}|r} &= \$1{,}000 \times 7.78611 \\ &= \$7{,}786.11 \end{aligned}$$

(b) How much would you be willing to pay for 13 payments of \$1, the first payment to begin 1 year from now? The rate of interest is 4%. The present value of \$1 due in 13 periods at 4% rate of interest is 0.600574.

$$\begin{aligned} A_{\overline{13}|4\%} &= \frac{1 - 0.600574}{0.04} = \frac{0.399426}{0.04} \\ &= \$9.9856 \end{aligned}$$

or, using Table 18–4,

$$A_{\overline{13}|4\%} = \$9.98565$$

Accounting for Bonds. Bonds are a promise to pay *a fixed sum* at a period of years hence, and a promise to pay *a certain amount each year* (or some other period) as interest. The payment of interest may be viewed as an annuity. Thus, to find the present worth of a bond, it is necessary to find the present worth of an annuity equal to the periodic interest payments, and also the present worth of a sum of money due a given number of years from now.

If the coupon rate of the bond differs from the rate of interest expected by the market (the yield rate), then the price of the bond will differ from the par value or maturity value of the bond. If the yield rate is equal to the coupon rate, then the issue price of the bond will be equal to the amount due at maturity. The equality is the result of the fact that the *present value of the amount due at maturity plus the present value of the annuity of interest payments* is equal both to the present liability and to the amount due at maturity. It is important to note that the liability is not being recorded as the amount due at maturity but as the sum of two different present values. These present values are equal to the maturity value of the liability because the yield rate is equal to the coupon rate. The necessity for the equality can be explained in two ways. If the coupon rate is r, then A dollars invested will yield r only if the original amount is intact at maturity. The second explanation is mathematical. Using PV to represent "present value," we write

$$PV \text{ of debt} = PV \text{ of maturity amount} + PV \text{ of interest payments}$$
$$PV \text{ of maturity amount} = S\,(1 - r)^{n}$$
$$PV \text{ of interest payment} = rS\left[\frac{1 - (1 + \mathrm{r})^{-n}}{r}\right]$$

The interest of each period is equal to rS, i.e., the rate of interest times the amount due at maturity. Thus we have

$$A = S\,(1 + r)^{-n} + rS\left[\frac{1 - (1 + r)^{-n}}{r}\right]$$

$$A = S\,(1 + r)^{-n} + S\left[1 - (1 + r)^{-n}\right]$$

$$A = S\,(1 + r)^{-n} + S - S\,(1 + r)^{-n}$$

$$A = S$$

The tables given in the following example are constructed to show the liability at the end of each period for a bond. The component parts of that liability, the present value of the amount due at maturity, and the present value of the interest payments to be made are shown.

Example

Compute the liability at the beginning of each period, assuming that the face value of the bond is $1,000, the coupon rate is 5%, and interest is paid annually. The bond is due at the end of 4 years (beginning of the fifth year).

TABLE 18–5

Effective Rate of Interest of 5%
(Effective and coupon rates of interest are equal)

	Beginning of period: 1	2	3	4	5
Present value of amount due at maturity date	$ 823	$ 864	$ 907	$ 952	$1,000
Present value of Interest payments of $50 per period (discounted at 5%)	177	136	93	48	
Total Liability	$1,000	$1,000	$1,000	$1,000	$1,000

TABLE 18–6

Effective Rate of Interest of 4%

	Beginning of period: 1	2	3	4	5
Present value of amount due at maturity date	$ 855	$ 889	$ 925	$ 962	$1,000
Present value of interest payments of $50 per period (discounted at 4%)	181	139	94	48	
Total Liability	$1,036	$1,028	$1,019	$1,010	$1,000

TABLE 18–7

Effective Rate of Interest of 6%

	Beginning of period: 1	2	3	4	5
Present value of amount due at maturity date	$792	$840	$890	$943	$1,000
Present value of interest payments of $50 per period (discounted at 6%)	173	134	92	47	
Total Liability	$965	$974	$982	$990	$1,000

Example: Recording Issuance of Bonds

Find the present value of one $1,000, 20-year, 4% bond with interest payments once a year.

Assume that the effective rate of interest is 3%.

Present worth of $1,000 discounted at 3%	$ 553.70
Present worth of an annuity of $40 a year for 20 years (14.8775 × $40)	595.10
Present value of 4% bond (yield of 3%)	$1,148.80

The bond will sell at a price of $1,148.80. The journal entry to record issue is:

Cash	$1,148.80	
Bonds Payable		$1,000.00
Premium on Bonds Payable		148.80

The premium account is an adjunct account to bonds payable; the liability at the time of issue is $1,148.80.

Assume that the effective rate of interest is 5%.

Present worth of $1,000 discounted at 5%	$376.90
Present worth of an annuity of $40 a year for 20 years discounted at 5% (12.4622 × $40)	498.49
Present value of the 4% bond (yield of 5%)	$875.39

The journal entry to record issue is:

Cash	$875.39	
Bond Discount	124.61	
Bonds Payable		$1,000.00

Bond discount is a valuation or contra account to bonds payable; the liability at time of issue is $875.39.

The interest charge for the first year may be obtained by multiplying the net bond liability by the effective rate of interest. With an effective rate of interest of 5%, the interest charge for the first year will be $875.39 × 5%, or $43.77. The journal entry will be

Interest Charge	$43.77	
Interest Payable		$40.00
Bond Discount		3.77

The credit to the contra liability account bond discount increases the liability. At maturity the liability will be the face amount of $1,000. At the end of the first year the bond liability is equal to $879.16.

Bonds Payable	$1,000.00
Less Bond Discount ($124.61 − $3.77)	120.84
	$ 879.16

The liability is also equal to:

Present worth of $1,000 discounted at 5% for 19 years	$395.73
Present worth of an annuity of $40 a year for 19 years discounted at 5% ($12.08532 × $40)	483.41
	$879.14

(There is an $0.02 rounding-off error.)

The bond discount will be credited each period until finally at maturity the balance in the account is zero, and the liability is recorded at its face amount, $1,000. At the end of the first year the account will have the following balance:

Bond Discount

√	$124.61	$ 3.77
		√120.84
	$124.61	$124.61
Balance	$120.84	

The interest charge for the second year will be computed by multiplying the liability, $879.16, by the effective rate of interest, 5%.

	$879.16
	×5%
Interest Year 2	$ 43.958

Interest Charge	$43.96	
Bond Discount		$ 3.96
Interest Payable		40.00

At the end of the second year the bond liability is equal to

Bonds Payable	$1,000.00
Less Bond Discount	116.88
	$ 883.12

The liability can be checked by comparing it to

Present worth of $1,000, discounted at 5% for 18 years	$415.52
Present worth of an annuity of $40 a year for 18 years ($40 × 11.68959)	467.58
	$883.10

This same procedure will be repeated each year until the bonds mature.

Compound Interest (or Sinking Fund) Method of Depreciation. The main advantage of the compound interest method of depreciation accounting is that under certain conditions it accomplishes the objective of having the return on investment (income divided by investment) undistorted by the method of depreciation accounting. The net cash proceeds to be earned by the asset must be constant, and the interest rate chosen in computing the depreciation charge must be equal to the rate of return of the depreciable asset (where the rate of return is defined as that rate of discount which equates the present value of the cash proceeds to the cost of the asset).[1]

The mechanics of the procedure are quite simple. In effect an attempt is made to *simulate* the workings of a sinking fund (a bank account). The amount deposited each period is constant, and interest is earned on the bank account. Similarly the depreciation charge for each period is equal to the "deposit" (which is a fiction) plus the amount of interest earned on the balance of the account.

The first step is to find the rate of return expected to be earned by the asset, since that will be the interest rate used to compute the fictitious interest earned on the fictitious bank account. The second step is to compute the amount of "deposit" to be made in each period, in order to accumulate in the fictitious bank account (which is really the allowance for depreciation) an amount equal to the cost of the asset (less any salvage expected).

Example

Assume an asset cost \$288.39. It has an expected life of 3 years, and the earnings (net cash proceeds) are \$100 per year. The cash proceeds are presumed to be earned on the last day of each year.

Step 1 Find the rate of return. This may be found by trial and error, or by consulting an annuity table. Since the present value of an annuity of \$1 per period for three periods, using a rate of discount of 2% is \$2.8838833, the rate of return of the asset is 2%.

Step 2 Compute the amount of deposit necessary to accumulate \$288.39 if three deposits are made, and if the amount "deposited" earns 2%.
This may be obtained from tables showing the periodic deposit that will amount to \$1 with an interest rate of 2%, and multiplying by \$288.39:

$$0.32675467 \times \$288.39 = \$94.23 \text{ (the annual ``deposit'')}$$

Alternative Computation:

$$RS_{\overline{3|}2\%} = 288.39$$

$$R \times 3.060 = 288.39$$

$$R = 94.23$$

---

[1] Cash proceeds refer to the difference between revenues and expenses which used funds; i.e., working capital.

The depreciation charge for each year will be as follows:

TABLE 18–8

Year	*Col. 1* Basic Deposit	*Col. 2* "Interest"	*Col. 3* Depreciation (Col. 1 & Col. 2)	*Col. 3* Total Accrued Depreciation	*Col. 4* Book Value (Beginning of Year)
1	$94.23	$ —	$ 94.23	$ 94.23	$288.39
2	94.23	1.89*	96.12	190.35	194.16
3	94.23	3.81**	98.04	288.39	98.04
			$288.39		

* 0.02 ($ 94.23) = $1.89
** 0.02 ($190.35) = $3.81

The depreciation charge for the first year is $94.23. The charge for the second year is equal to the basic "deposit," $94.23, plus 2% "interest" on the balance of the total accrued depreciation at the beginning of the year ($94.23 plus $1.89). The depreciation for the third year is equal to the basic "deposit," $94.23, plus 2% "interest" on the balance of the total accrued depreciation at the beginning of the year ($94.23 plus $3.81). Thus the depreciation for successive years increases by 2% of the depreciation charge of the prior year. This increasing depreciation charge is the prime weakness of the procedure, since it is not a measure of the cost of using the asset.

Table 18–9 shows what happens to income and return on investment when the compound interest method of computing depreciation is used.

TABLE 18–9

Year	Net Cash Proceeds	Depreciation	Net Operating Income	Investment Beginning of Year	Return on Investment
1	$100.00	$94.23	$5.77	$288.39	2%
2	100.00	96.12	3.88	194.16	2%
3	100.00	98.04	1.96	98.04	2%

Table 18–9 highlights the strengths and weaknesses of the compound interest method. The operating income decreases through the years, since the depreciation charge for later years actually increases, but the return on investment is constant. The increase in depreciation argues against using the procedure, but the constant return on investment is reasonable in view of the constant net cash proceeds. If attention is focused on depreciation, the compound interest procedure is not very good; if attention is focused on investment return, the rating of the method improves.

Theoretical Basis of the Compound Interest Method of Depreciation Accounting. The preceding section described the mechanics of the compound interest method, but it did not offer a theoretical justification of the procedure. In this section the theory behind the procedure will be explained.

When an asset is purchased, it is reasonable to look at the purchase of the asset as the purchase of future earning power. For example, the purchase of a piece of equipment for $288.39 may be said to be the actual purchase of future net cash proceeds. Assume that the asset is expected to earn net cash proceeds of $100 in each of the 3 years following its purchase. This results in an investment rate of return, or yield, of 2%. The present value of the future cash proceeds can be computed (Table 18–10).

TABLE 18–10

Year	Cash Proceeds	Present Value of $1 (2% Interest Rate)	Present Value of Cash Proceeds
1	$100	$0.9804	$ 98.04
2	100	0.9612	96.12
3	100	0.9423	94.23
			$288.39

It can be said that $98.04 is being paid for the first period's net cash proceeds, $96.12 for the second period's net cash proceeds, and $94.23 for the third period's proceeds. These amounts can be called the *basic* depreciation charges. To these basic charges can be added an implicit interest cost for using the investment. For the first year's revenues the investment is $98.04 (the amount paid for the first year's revenues) and the interest cost is $1.96 (2% of $98.04). Thus the basic depreciation plus the implicit interest charge of the first year is $100. But the entire investment earned implicit interest revenue of $5.77 (2% of $288.39). The compound interest method of depreciation suggests that the depreciation for the first year is $94.23 ($98.04 plus $1.96 minus $5.77).

The interest revenue of $5.77 requires explanation. The $5.77 is equal to 2% of the book value of the investment and is the *implicit* interest revenue (and interest cost) brought into being by the use of the investment. If the interest cost of using the investment is $5.77, why was only $1.96 considered an interest expense of the period? The $3.81, the difference between the total interest cost of $5.77 and the portion applicable to this period, $1.96, is applicable to future periods. This is shown by Table 18–11.

TABLE 18–11

Year	Present Value of Cash Proceeds (Investment Applicable to Each Year)		The First Year's Implicit Interest Cost (2%)
1	$ 98.04	× 2%	$1.96 (applicable to 1st year)
2	96.12	× 2%	1.92 (applicable to 2nd year)
3	94.23	× 2%	1.89 (applicable to 3rd year)
	$288.39	× 2%	= $5.77

The schedule of depreciation for the 3 years is given in Table 18–12.

TABLE 18–12

Year	Basic Depreciation * (Cost of Net Cash Proceeds)	Implicit Interest Cost **	Sum of Deprec. Plus Int. Cost	Implicit Interest Revenue †	Deprec. Compound Int. Method
1	$ 98.04	$ 1.96	$100.00	$ 5.77	$ 94.23
2	96.12	3.88	100.00	3.88	96.12
3	94.23	5.77	100.00	1.96	98.04
	$288.39	$11.61	$300.00	$11.61	$288.39

* Present value of the predicted net cash proceeds.

** The interest cost on the investment (present value of the net cash proceeds) accumulated for the proper number of periods.

† The implicit interest revenue (2% of the net book value of the total investment as of the beginning of the period).

The foregoing computations may seem complicated, but they are necessary in order to understand the significance of the compound interest method of depreciation accounting. In the preceding section, Table 18–9 showed the *net* operating income. Table 18–13 shows additional refinements.

TABLE 18–13

Year	Net Cash Proceeds	Basic Depreciation	Net Operating Income	Interest Cost	Net Income before Interest Revenue	Interest Revenue	Net Income
1	$100.00	$ 98.04	$ 1.96	$ 1.96	$ -0-	$ 5.77	$ 5.77
2	100.00	96.12	3.88	3.88	-0-	3.88	3.88
3	100.00	94.23	5.77	5.77	-0-	1.96	1.96
	$300.00	$288.39	$11.61	$11.61	$ -0-	$11.61	$11.61

QUESTIONS AND PROBLEMS

18–1. If $1 is deposited on January 1, how much money will have accumulated at the end of 1 year if:

(a) The bank computes interest annually, using an interest rate of 4%?

(b) The bank computes interest every 6 months, using an interest rate of 2% every 6 months?

(c) What is the *effective annual* rate of interest for the situation described in part (b)? (Subtract the original deposit of $1 from the amount in the account at the end of 1 year.)

18–2. (a) What is the present value of $1,000 due in 10 years, discounted at 4%?

(b) What is the present value of $40 per year for a period of 10 years if the rate of interest used to discount the payments back to the present is 4%?

(c) What is the sum of the two amounts obtained in parts (a) and (b)?

(d) At what price would a 4%-$1,000 ten year bond sell if it is to yield 4%?

18–3. (a) What is the present value of $1,000 due in 10 years? Use a 4% rate of interest.

(b) What is the present value of $50 per year for a period of 10 years? Use a 4% rate of interest.

(c) What is the sum of the amounts obtained in parts (a) and (b)?

(d) At what price will a 5%, $1,000, 10-year bond sell if it is to yield 4%?

(e) Record the issuance of such a bond on January 1 and the payment of the first year's interest on December 31.

18–4. The Machine Tool Company sold a piece of equipment for $100,000 (the nominal price) on January 1, 1957. The $100,000 is to be paid exactly 2 years from the date of sale. The rate of interest for 2-year loans is currently 4% per year. The company closes its books annually on December 31.

Required

(a) Record the sale of the equipment and the collection of the cash proceeds by the Machine Tool Company.

(b) Record the purchase of the equipment and the payment of the cash by the company which purchased the equipment.

18–5. The Machine Tool Company sold a piece of equipment for $200,000 (the nominal price) on June 30, 1957. The $200,000 is to be collected in four equal semi-annual payments of $50,000 each. The rate of interest for 2-year loans or less is currently 4% per 6 months, or 8.16% per year. The company closes its books annually on December 31.

Required: Record the sale of the equipment and the collection of the cash proceeds by the Machine Tool Company.

18–6. Determine the amount you would be willing to pay for a $1,000, 4%, 20-year bond. You desire a yield of 6.09% per year (3% compounded every 6 months). Interest is to be paid twice a year.

18–7. The Marwick Company authorized a bond issue of ten $1,000, 5%, 20-year bonds.

Required

(a) Record the issuance of the bonds on January 1, 1957, so as to yield 4.04% annually (2% compounded twice a year).

(b) Record the accrual of interest on June 30, 1957, and the payment on July 1.

(c) Record the accrual of interest on December 31.

(d) What will be the bond liability on January 1, 1967?

18–8. The Firewick Company authorized a bond issue of ten $1,000, 5%, 20-year bonds.

Required

(a) Record the issuance of the bonds on January 1, 1957, so as to yield 6.09% annually (3% compounded every 6 months).

(b) Record the accrual of interest on June 30, 1957, and the payment of interest on July 1.
(c) Record the accrual of interest on December 31.
(d) What will be the total bond liability on January 1, 1967?

18–9. On January 1, 1956, the X Company issued one hundred $1,000, 5% bonds to yield 4%. The 4% is a nominal rate of interest. The exact yield is 4.04% per year or 2% per 6 months. The bonds were issued for 20 years and interest is payable semi-annually. The X Company closes its books on December 31 of each year.

Required

(a) Compute the amount the X Company received for the issue on January 1, 1956. Record the issue of the bonds.
(b) Make all entries necessary to record.
    1. The first interest payment.
    2. The second interest payment.

18–10. A piece of equipment which cost $100,000 has an expected life of 5 years and a forecasted net salvage value at retirement of $1,024. It is purchased on January 1. Assuming a rate of interest of 6%, a deposit of $0.1774 per period for five periods will amount to $1 after five periods. Using the "compound interest" method of computing depreciation, compute the depreciation charge and the allowance for depreciation for each of the 5 years of the life of the asset.

18–11. The president of the Electric Utility Company is concerned about the choice of the method used to compute depreciation of plant assets. The straight-line method has been used in the past with the result that the company's rate of return has been increasing, despite the fact that the income of the firm has not been increasing. Unlike many public utilities the company has been purchasing a relatively small amount of plant assets in recent years.

Equipment costing $10,000 was purchased in 1957. It has an expected life of 5 years. The rate commission allows a rate of return of 6%, based on the book value of the assets in use on January 1 of the year in question.

Required

(a) Compute the depreciation that will least distort the rate of return computation. The revenue earning power of the asset is assumed to be constant over its entire life. A deposit of $0.1774 per period for five periods will amount to $1 after five periods, assuming an interest rate of 6%. It is expected that the tax commission will allow revenues of $2,374 to be earned on this asset each year of its life. Assume that there are no expenses except depreciation.
(b) Prepare a schedule showing revenues, depreciation, income, rate base (asset) balance, and rate of return for each year.

*

19

Preparation and Analysis of Income and Position Statements

THE MAIN functions of this chapter will be to suggest a few of the more popular arrangements in use, to point up the limitations of the various methods of presenting the income statement and position statement, and to introduce the subject of financial statement analysis.

All-Inclusive Single-Step Income Statement. The all-inclusive single-step income statement has the virtue of being simple, yet it discloses all information that the reader of a financial report may desire. This description may give the impression that the search for a perfect income statement ended with the development of this form. Unfortunately it has one fault. The information is disclosed, but it requires expert interpretation. The necessity for interpretation occurs because the revenues and expenses of this year are intermingled with the adjustments of previous years' incomes and charges arising from extraordinary occurrences (such as losses arising from floods, fires, wars) to obtain an item labeled "Net Income." Thus the results of this period's operations are in a sense buried with items which did not necessarily result from this period's operations.

Example: All-Inclusive Single-Step Income Statement

The following form is the simplest form in which the income statement can be presented. Though it often is not explicitly stated, the "Net Income" shown in the following income statement is the income of the stockholders. Frequently the "Net Income" *of all capital contributors* will be shown, and then interest charges will be subtracted to find the income of the stockholders. If dividends are then subtracted, the residual will become the addition to the retained earnings for the year.

ABC COMPANY

INCOME STATEMENT FOR YEAR ENDING
DECEMBER 31, 19–

Revenues			
Sales Revenues	$20,000		
Less Sales Discounts	400	$19,600	
Other Revenues		900	
Adjustments (describe)		1,100	$21,600
Revenue Deductions			
Expenses (list)		$13,000	
Interest Charges		100	
Taxes		4,000	$17,100
Net Income			$ 4,500

All-Inclusive Multi-Step Income Statement. Instead of preparing the income statement so that there is only one "Income" figure shown, various subtotals may be included. Used in moderation, this is a useful device. For example, it would be possible to show the "Income from Operations," and then add or subtract the various adjustments and extraordinary items to compute the "Net Income." Having two income figures may confuse the reader slightly, but the necessity for distinguishing the results of this year's operations from other items which affected the change in the retained earnings may well justify the amount of confusion introduced.

Unfortunately the multi-step income statement often does not stop with two "Income" figures but continues on with such subtotals and titles as: Gross Income from Sales (actually revenues), Gross Profit, Income before Depreciation, and Income before Taxes. An accountant can get lost in the forest of figures that are sometimes shown on income statements.

Example: An All-Inclusive Multi-Step Income Statement

ABC COMPANY

INCOME STATEMENT FOR YEAR ENDING
DECEMBER 31, 19–

Revenues		
Sales	$20,000	
Less Sales Discounts	400	$19,600
Revenue Deductions—Expenses		
Manufacturing Cost of Goods Sold	$10,000	

Selling Expenses		2,000	
Administrative Expenses		1,000	
Taxes, Income		4,000	17,000
Net Operating Income			$ 2,600
Other Revenues and Adjustments			
Interest Revenues	$ 900		
Adjustment of Depreciation	1,100	$2,000	
Other Deductions			
Interest Charges		100	$1,900
Net Income			$4,500

By-passing the Income Statement. Up to this section it has been assumed that accountants never make entries directly to retained earnings for any transactions other than the declaration of dividends, transfer of the period's income, or transactions concerned with retiring of capital stock. Actually, some accountants make entries directly to retained earnings for transactions which do not affect this period's operations or which are extraordinary in nature. Making entries directly to retained earnings carries the implication that the transaction will not be disclosed in the income statement. By-passing the income statement is not a good practice. It gives management an opportunity to manipulate the incomes of successive periods, which is not possible if all items must be disclosed. For example, they may charge less than normal depreciation for 4 years and show an income. If in the fifth year depreciation is adjusted by debiting retained earnings directly and crediting the allowance for depreciation, none of the incomes of the five years will be charged with the pro rata cost of using the fixed assets during the five year period. If the accountant is not allowed to make entries directly to retained earnings, then the fifth year's income will have to bear the burden of the depreciation adjustment, and the manipulation will lose much of its purpose.

The Position Statement. The most popular method of presenting the financial position of a business enterprise is the *balanced array* presentation. This procedure shows the total assets and the total equities arrayed side by side, or the equities immediately below the assets. The total assets will, of course, equal the total equities.

An alternative method of presentation is the *step* presentation. This form has the advantage of highlighting the relationship of the current assets to the current liabilities and of showing the difference between the two (net working capital). It has the disadvantage of not showing the total assets, and even more important of not showing the total liabilities.

UNITED STATES STEEL CORPORATION †

CONSOLIDATED STATEMENT OF INCOME

	1956	1955
Products and services sold	$4,228,877,241	$4,097,680,287
Costs		
Employment costs		
Wages and salaries	1,455,616,321	1,415,011,634
Pensions and other employe benefits	225,852,981	199,874,025
	1,680,969,302	1,614,885,659
Products and services bought	1,487,517,900	1,355,237,023
Wear and exhaustion of facilities	277,598,963	285,199,386
Interest and other costs on long-term debt	7,666,374	9,071,803
State, local and miscellaneous taxes	96,025,786	97,187,063
Estimated United States and foreign taxes on income	331,000,000	366,000,000
Total	3,880,778,325	3,727,580,934
Income	348,098,916	370,099,353
Dividends declared		
On cumulative preferred stock *($7 per share)*	25,219,677	25,219,677
On common stock *($2.70 per share 1956, $2.30* per share 1955)*	144,884,201	122,907,433
Income reinvested in business	$ 177,995,038	$ 221,972,243

*Adjusted to reflect 2 for 1 stock split on May 12, 1955.

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† Courtesy the United States Steel Corporation.

UNITED STATES STEEL CORPORATION †

CONSOLIDATED STATEMENT OF FINANCIAL POSITION

		Dec. 31, 1955	Dec. 31, 1954
Current assets			
Cash		$ 249,817,576	$ 226,318,363
United States Government securities, at cost		317,659,464	413,260,066
Receivables, less estimated bad debts		300,576,212	214,988,648
Inventories		475,086,019	471,474,749
Total		1,343,139,271	1,326,041,826
Less			
Current liabilities			
Accounts payable		352,944,492	288,781,173
Accrued taxes, less United States Government securities of $346,800,000 at December 31, 1955 and $190,000,000 at December 31, 1954		220,861,844	212,525,329
Dividends payable		41,101,678	32,875,467
Long-term debt due within one year		33,089,933	39,846,636
Total		647,997,947	574,028,605
Working capital		695,141,324	752,013,221
Miscellaneous investments, less estimated losses		36,356,888	21,114,110
United States Government securities, at cost, set aside for property additions and replacements		300,000,000	–
Plant and equipment, less depreciation		1,873,614,626	1,925,710,009
Operating parts and supplies		43,208,254	45,707,261
Costs applicable to future periods		24,041,577	30,123,093
Total assets less current liabilities		2,972,362,669	2,774,667,694
Deduct			
Long-term debt		286,083,534	324,120,277
Reserves for insurance, contingencies and accident and hospital expenses		103,707,084	101,834,776
Excess of assets over liabilities and reserves		$2,582,572,051	$2,348,712,641
Ownership evidenced by			
Preferred stock, 7% cumulative, par value $100 (authorized 4,000,000 shares; outstanding 3,602,811 shares)		$ 360,281,100	$ 360,281,100
Common stock (authorized 90,000,000* shares; outstanding 53,495,274 shares at December 31, 1955, and 52,782,044* shares at December 31, 1954)		2,222,290,951	1,988,431,541
Par value, $16⅔ per share	$ 891,587,900		
Income reinvested in business *(addition of $221,972,243 in 1955)*	1,330,703,051		
Total		$2,582,572,051	$2,348,712,641

*Adjusted to reflect 2 for 1 stock split on May 12, 1955.

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† Courtesy the United States Steel Corporation.

UNITED STATES STEEL CORPORATION †

SUMMARY OF 1956 FINANCIAL OPERATIONS

Additions to working capital		
Income		$348,098,916
Add — Wear and exhaustion of facilities		277,598,963
Proceeds from sales and salvage of plant and equipment		29,812,853
Proceeds from sale of common stock under Stock Option Incentive Plan		4,760,696
Total additions		660,271,428
Deductions from working capital		
Expended for plant and equipment	$311,792,037	
Set aside for property additions and replacements	225,000,000	
Reduction in total long-term debt	42,674,975	
Dividends declared on preferred and common stocks	170,103,878	
Miscellaneous deductions	2,102,834	
Total deductions		751,673,724
Reduction in working capital		$ 91,402,296
Working capital per consolidated statement of financial position		
December 31, 1956	$603,739,028	
December 31, 1955	695,141,324	
Reduction		$ 91,402,296

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† Courtesy the United States Steel Corporation.

Example: Position Statement—Step Method of Presentation:

ABC COMPANY
POSITION STATEMENT
AS OF DECEMBER 31, 19–

Current Assets		
Cash	$ 5,000	
Receivables	20,000	
Inventories	15,000	
Total Current Assets		$40,000
Less Current Liabilities		
Accounts Payable	$ 4,000	
Taxes Payable	6,000	
Total Current Liabilities		10,000
Net Working Capital		$30,000
Plus Noncurrent Assets		
Plant and Equipment	$12,000	
Less depreciation to date	4,000	
Total noncurrent assets		8,000
		$38,000
Less Noncurrent Liabilities		
Bonds Payable		15,000
Total Net Assets		$23,000
Stockholders' Equity		
Capital Stock	$10,000	
Retained Earnings	13,000	
Total		$23,000

Position Statement and Financial Position. It should never be assumed that the position statement as prepared by the accountant reflects the present worth of the enterprise. This is not to imply that accountants are dishonest, for the discrepancies are the inevitable result of accepted accounting conventions, changing price levels, changing economic conditions, or faulty judgment. It should be remembered that the corporation is assumed to have an infinite life and the "going concern" convention is the foundation for the methods used by the accountant in reporting financial position.

The following items are illustrative of the reasons why the position statement may fail to reflect the present financial situation of the corporation:

Result of Accepted Accounting Conventions
    Use of LIFO for measuring value of inventories

  - Treatment of development and organization costs
- Result of Changing Price Level (with accounting conventions)
  - Inventories (especially if LIFO is used)
  - Fixed Assets
- Changing Economic Conditions
  - Inadequate accruals of depreciation
  - Failure to write off obsolete plant and equipment
- Faulty Judgment
  - Inadequate depreciation accruals
  - Inadequate allowance for uncollectable accounts
  - Treatment of goodwill and other intangibles

Consolidated Statements

It is not unusual for one corporation to own shares of common stock of one or more other corporations. The percentage of ownership may vary from a few shares, representing an insignificant percentage of ownership, to 100% of the shares outstanding. If the percentage of ownership is very small, the investment is generally presented on statements of financial position at cost. In situations where the percentage of ownership is large, it is general practice for the parent company (the corporation owning the stock of the subsidiary company) to present consolidated financial statements. Instead of presenting the original investment in the subsidiary corporation, the assets and liabilities of the subsidiary corporation are combined with the assets and liabilities of the parent company and presented in one statement of financial position. The revenues and expenses of the parent and subsidiary corporation, or corporations, are also shown in one consolidated income statement.

When to Consolidate. The financial affairs of two or more corporations should not be combined into single statements unless the extent of control is significant, i.e., the two corporations act effectively as one corporation. A study made by the American Institute of Certified Public Accountants showed that the criteria which determined whether or not to consolidate varied considerably from firm to firm.[1] Majority ownership was required by many firms, but some included corporations in which they had a minority interest. Another firm only included the subsidiary corporation in which it had interests as high as 90%.

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[1] American Institute of Certified Public Accountants, *Survey of Consolidated Financial Statement Practices* (New York: American Institute of Certified Public Accountants, 1956), pp. 7–10.

Other factors affecting whether or not subsidiary corporations are consolidated are listed below.

a. If the operations of the subsidiary and parent are materially different, the subsidiary is frequently excluded.
b. Foreign subsidiaries are often excluded from consolidation.
c. Differences in accounting periods may cause the consolidation to be impractical.
d. If there are senior securities outstanding (such as bonds or preferred stock) the corporation may decide that even though it holds a majority of the common stock, the percentage of ownership of total equities is too small to warrant consolidation.
e. If the subsidiary is in bad financial condition, especially if it is bankrupt or insolvent, it may be excluded.
f. Several other factors are taken into consideration such as materiality of the subsidiary and whether the subsidiary is inactive.

Consolidation of the financial affairs of corporations is inconsistent with the entity theory of accounting, which implies that we are accounting for the corporation, a separate legal entity. However, the accountant correctly sets aside the entity theory in order to avoid the hopeless tangle which would result if he presented separate reports of the parent and twenty subsidiaries. In any event, the reader would have to prepare his own consolidated statements in order to see the over-all financial picture of a complex organization.

It should be recognized that even when the affairs of the parent and its subsidiaries are consolidated, it is still desirable to show the financial affairs of the parent or one or more major subsidiaries separately.

Consolidated Position Statements. The first step in preparing consolidated statements of financial position is to eliminate two items which would result in double counting if they were included. These two items are the original investment of the parent and the stock equity of the subsidiary at the time of purchase. The stock equity of the subsidiary as of the date of stock purchase must be eliminated because the stock equity of the parent company (or of the consolidated company) is not increased by a purchase. The investment account must be eliminated since the consolidation procedures effectively change the purchase of common stock into the purchase of assets and the assumption of liabilities.

The first illustration will assume that the parent, Company A, has purchased 100% of the common stock of Company B. Note that the amount paid in this simple example will be equal to the book value of the stock.

Illustration

Company A buys 100% of the common stock of Company B for $10,000. The first two columns of the work sheet show the financial position of the two companies immediately after the purchase of stock. The consolidation procedures and the consolidated position statement are as follows:

Accounts	Company A	Company B	Eliminations Dr.	Eliminations Cr.	Consolidated Position Statement
Other Assets	30,000	18,000			48,000
Investment in Co. B	10,000			(1) 10,000	
	40,000	18,000			48,000
Liabilities	15,000	8,000			23,000
Capital Stock	20,000	7,000	(1) 7,000		20,000
Retained Earnings	5,000	3,000	(1) 3,000		5,000
	40,000	18,000	10,000	10,000	48,000

The elimination entries are to credit the investment account to eliminate the investment in Company B (but leaving the assets of Company B) and eliminating the stock equity of Company B as of the time of purchase.

Complications may be introduced by having Company A purchase 100% of the common stock at a price different than the book value of the stock equity of Company B. For example, if Company A had paid $12,000 for book value of $10,000, this would indicate that Company A thought there were intangible values in the situation, or that the assets were undervalued. If the former is assumed to be true, the elimination entry would be:

Capital Stock	$7,000	
Retained Earnings	3,000	
Goodwill	2,000	
Investments		$12,000

Again the investment and the stock equity are eliminated. In this situation an intangible asset of $2,000 is recognized since we paid $2,000 more than the book value of the assets. If we can trace the excess of purchase price to specific asset accounts, then those asset accounts should be debited, not the goodwill account.

Assume that we have paid $8,000 for the common stock. This is an amount less than the book value. The book value of the assets is overstated, and there is a type of negative goodwill. Negative goodwill indicates that the earning power of the assets is actually less than we might expect from assets of this nature. The elimination entry would be:

Capital Stock	$7,000	
Retained Earnings	3,000	
Investment		$8,000
Excess of Book Value over the Investment		2,000

The credit item is frequently placed on the equity side of the position statement, although it would be reasonable to subtract it from the total tangible assets. As explained above, it is, in a sense, negative goodwill.

Another complication arises when we purchase an amount other than 100% of the common stock outstanding. This gives rise to a minority interest in the consolidated corporation. If we assume the same situation as above but that we purchase 80% of the common stock for $8,000, the elimination entries would be:

Capital Stock	$7,000	
Retained Earnings	3,000	
Investment		$8,000
Minority Interest		2,000

The minority interest would appear on the position statement between the liabilities and the stockholders' equity. It represents the interest of outside stockholders of the subsidiary in the assets of the consolidated corporation.

Further complications are outside the scope of this text, but they include the purchase of a minority interest at other book value, the purchase of a subsidiary by a subsidiary, and the purchase of stock in a subsidiary where the stock is purchased at several different moments of time.

Consolidation in a Later Period. In the periods after purchase, the basic elimination entry for consolidation is the same as the one made at the time of purchase. The significance of this treatment is that the incomes earned and retained since the purchase of stock are *not* eliminated. However, additional elimination entries may be necessary for debts owed by one of the corporations to another, or proper recognition of other transactions.

Returning to the first illustration where the book value was $10,000 and the amount paid for 100% of the stock was $10,000, let us assume that after one period of operations the accounts of the two companies are as presented in the first two columns. Company B owes Company A $4,000 for a cash advance made by Company A. The consolidation worksheet would be as follows:

Accounts	Company A	Company B	Eliminations		Consolidated Position Statement
			Dr.	Cr.	
Other Assets	35,000	21,000		(2) 4,000	52,000
Investment in Co. B	10,000			(1) 10,000	
	45,000	21,000			52,000
Liabilities	16,000	10,000	(2) 4,000		22,000
Capital Stock	20,000	7,000	(1) 7,000		20,000
Retained Earnings	9,000	4,000	(1) 3,000		10,000
	45,000	21,000	14,000	14,000	52,000

Note that elimination entry (1) is the same as that made for consolidation at the time of purchase. Only the stock equity in existence at the time of purchase is being eliminated. The retained earnings coming into being since the time of acquisition do not have to be eliminated since they actually do increase the total retained earnings of the consolidated company. Entry (2) eliminates the receivable and payable which exists between the companies being consolidated. This is, in effect, saying that we cannot owe ourselves money, and if one segment of a consolidated company owes another segment of the same company, then the asset and debt must both be eliminated. If this were not done, we would be in the strange position of reporting an asset which consists of a promise to pay by the same consolidated entity which reports the asset. This is a type of double counting of assets and liabilities and must be eliminated.

Income Statements. If the several corporations being consolidated do not sell products to each other, the consolidated income statement is very simple. It is merely a matter of adding up the total revenues of the several corporations and subtracting the expenses.

A complication arises when the corporations sell goods to each other. If it is assumed that Company A has sold goods to Company B at a sale price of $1,000 and the goods sold cost $850, and that Company B still has the goods in inventory, Company A would report revenues of $1,000, expenses of $850, and an income of $150. Should this $150 of income be shown in the income statement of the consolidated company with the goods still in Company B's inventory? There are strong arguments in favor of eliminating the profits of an inter-company transaction which have not yet been realized by a sale to a third party. In this case it would be necessary to reduce the revenues and the expenses, and to remove the profits from inventory. The following elimination entry would be appropriate:

Revenues	$1,000	
Cost of Goods Sold		$850
Inventories		150

For purposes of the consolidated income statement we have to reduce revenues by $1,000, expenses by $850, and income by $150. The elimination must also be shown on the work sheet for preparing the consolidated position statement. It is necessary to reduce the inventory of Company B, because the inventory includes $150 of intra-company profit. It is also necessary to eliminate the $150 increase in retained earnings of Company A which can be traced to this transaction. The elimination entry would be:

Retained Earnings (Company A)	$150	
Other Assets (Inventory Company B)		$150

Summary—Consolidated Statements. The basic concepts and purposes of consolidated statements are relatively simple. We are attempting to merge the financial results of many operating units into one financial statement, eliminating internal transactions and double counting which would otherwise appear in the consolidated statements. However, the execution of preparing consolidated statements can become extremely complex if we remove the simplifying assumptions.

It should be recognized that when the financial affairs of many corporate entities are merged together, the good and bad points of the several corporations will be averaged together. Thus, the consolidated reports may conceal trouble spots which may exist either in the parent or in the subsidiaries. On the other hand, consolidated reports are ingenious devices for summarizing the financial results of many financial institutions in a form relatively easy to understand.

Analysis of Financial Statements

There are no short cuts to intelligent analysis of financial statements, for there are many items in financial statements which are not what they seem to be, and only a knowledge of accounting theory and practice can ensure a sound interpretation. Equally important is the fact that the analysis should be detailed and should not rely upon a few rules of thumb (usually taking the form of ratios). There are various tools that, when intelligently used, are exceedingly helpful, but none of these tools of analysis is any better than the information upon which it is based.

This section will deal with some of the more common pitfalls awaiting the unwary analyst of financial statements, and the use of the tools of financial analysis. It should be noted that financial analysis based on published accounting data is essentially a short-run analysis. The long-run future of the firm is related to future business conditions, technology, and other items which the accountant does not measure (such as the caliber of the younger executives of the firm).

Assets or Debits? One of the first things the analyst should realize is that all items on the asset side of the position statement are not assets; some are accounts with debit balances which are mistakenly placed in the assets section. Some examples of these items are treasury stock, treasury bonds, "prepaid interest," bond discount, and even operating deficits.

Another problem arises because certain items which the accountant classifies as assets have no liquidation or sale value. They appear on the position statement because they apply to the revenues of future periods, or because they are considered permanent assets. Among these items are goodwill, organization costs, bond issue costs, and development costs. Items of this nature may be eliminated by the financial analyst when he is computing the assets of the firm. He should include only tangible assets unless the intangible assets have an easily determined market price; for example, a patent recently purchased.

Equities or Credits? Public utilities are frequently guilty of the practice of placing the allowance for depreciation on the equity side of the position statement. This tends to overstate total assets and should be adjusted by the analyst. The allowance for depreciation is properly a subtraction from fixed assets.

Another difficulty is the treatment of the various items found between the liabilities and the stockholders' equity. There is little need for using this category of accounts. Such items can be usually classified as liabilities or stockholders' equity. Thus, advances by customers (sometimes called *unearned income*) is actually a liability, and reserve for contingencies is usually stockholders' equity (unless the reserve is set up for a specific contingency, and is in fact a liability).

Valuation of Assets. The four main problems of valuation arise in the areas of intangibles, inventories, investments, and fixed assets. The problem of valuing intangibles is avoided, since they are to be subtracted by the analyst from the asset total (they will be considered a residual, valued by earning power in excess of what would normally be expected from the tangible assets). The problem of valuing inventories is especially important when the firm has been using LIFO. Usually the analyst will not have the information necessary for accurate adjustment unless he has access to company records or unless the market value of the inventory is stated in the financial report. Taking this information, the analyst may either make a rough estimate or use the LIFO valuation and qualify his figures. The problem of valuing investments is simplified by the fact that market values are often given in the financial report. If they are not given, and the specific nature of the investment is not stated, then the analyst is again at a disadvantage. The problem of valuation of fixed assets is actually a double problem of finding the present value of the assets and the extent to which their useful life has expired. These two items may bear little or no relationship to the original cost of the asset or book depreciation. Usually the analyst will accept the book figures, although he should realize that the information given on the position statement may have no relationship to current values of the fixed assets.

Indirectly these comments on the asset and equity sides of the position statement and on the valuation of assets stand as an indictment of current financial reporting. For many purposes financial reporting is inadequate and far from complete. In some cases it is actually misleading.

The Income Statement. It is somewhat comforting to see that a share of stock earned X dollars and Y cents. This is a positive and clear-cut statement, although it may also be misleading. The measurement of the income of a business entity for a short period of time is a difficult process. The smaller the period of time, the more difficult the measurement, but this is not the place for a critique of current income measurement theory. Thus, only a few items requiring appraisal will be mentioned.

One of the main difficulties is the inclusion or exclusion of items that are essentially adjustments of prior years' incomes and not revenues of this period or expenses of gaining the revenues of this period. An item of this nature, when large, can distort the measurement of the period's income.

Two other difficulties stem from the measurement of depreciation and tax expense of the period. The depreciation expense is complicated by the changes in the price level, the choice of the method of depreciation, and the allowance of rapid depreciation for tax purposes. The last item is especially important when it is being administered under a certificate of necessity given by the federal government, which allows a firm to depreciate the cost of an asset over a 5-year period. The income tax is affected because it will be decreased in the early years and increased in the later years. The handling of these difficulties varies to a great extent among companies, and the analyst should not compare without adjustment companies which use different procedures.

The cost-of-goods-sold charge will be affected by the choice of inventory procedure; thus the analyst may be faced with a necessity for adjustment. This is especially true since both FIFO and LIFO may be used.

There are a whole host of problems connected with deciding whether an item is an expense of this period or actually should be spread over several accounting periods. Examples of these items are repairs, maintenance, research, and development expenditures. The analysis is even further complicated by the fact that many of these expenditures may be postponed for several periods. Thus, a major railroad, which commonly charged all repairs to expense, improved its reported income for a year by reducing necessary maintenance. As might be expected, in the next period trains began to break down with increasing frequency.

Despite these complications, an analysis and comparison of the incomes of corporations can be very revealing, especially if the measurements of the incomes are placed on comparable bases.

Ratio Analysis. Financial ratios are useful because of their ability to summarize briefly the results of detailed and complicated computations. The danger from using ratio analysis is to examine only one ratio and draw an unwarranted conclusion. For example, an investor purchased the stock of a company largely on the basis of its sound current position (current assets were 20 times larger than current liabilities). The fact that this company was committed to purchasing a large amount of fixed assets had not been taken into consideration.

Among the ratios to be studied are:

- Position Statement Ratios
  - Quick Ratio
  - Current Ratio
  - Stock Equity Ratio
  - Stock Equity–Asset Ratio
- Income Statement Ratios
  - Operating Ratios
- Income-Position Statement Ratios
  - All-Asset Earning Rate
  - Stock-Equity Earning Rate

In addition to these ratios there are other computations which are relevant:

Working Capital
Book Value per Share of Common Stock
Earnings per Share of Common Stock
Dividends per Share of Common Stock

Quick and Current Ratios. Both the quick and current ratios give an indication of the current position of the firm. The two ratios differ in that the quick ratio includes only the more liquid of assets, usually only cash, marketable securities, and good accounts receivable. Thus the quick ratio gives a picture of the firm's ability to meet its immediate liabilities, assuming the very worst in terms of operations. The current ratio, by including all current assets, gives an indication of the firm's ability to meet its short term liabilities, assuming normal operations.

The quick ratio is also called the *acid test* ratio.

$$\text{Quick ratio} = \frac{\text{very liquid assets}}{\text{current liabilities}}$$

$$\text{Current ratio} = \frac{\text{current assets}}{\text{current liabilities}}$$

Stock Equity Ratio and the Stock Equity–Asset Ratio. These ratios give an indication of the ability of the firm to survive losses from the point of view of the financial position of the firm. Obviously the earning prospects of the firm are also relevant in judging a firm's ability to survive in the long run. The stock equity ratios are only two of the factors to be taken into consideration.

There are numerous ways in which the stock equity ratio may be expressed; for example, the ratio of stock equity to total assets, the ratio of long term debt to stock equity, or the ratio of stock equity to the sum of long term debt and stock equity. Two definitions will be used here.

$$\text{Stock equity ratio} = \frac{\text{stockholders' equity}}{\text{long term debt plus stockholders' equity}}$$

$$\text{Stock equity–asset ratio} = \frac{\text{stockholders' equity}}{\text{total assets}}$$

Operating Ratios. It is more reasonable to speak of operating *ratios* than an operating *ratio*. The most useful procedure is to take a ratio of each revenue deduction and the income to the total revenue figure. In effect the uses of the revenues are being identified.

Example

		Operating Ratios
Sales	$10,000	100%
Less Sales Discounts	300	3
Net Revenues	$ 9,700	97%
Expenses and Taxes		
Cost of Goods Sold	$ 3,000	30%
Selling Expense	2,000	20
Administrative Expense	2,700	27
Income Taxes	1,000	10
Total Expenses and Taxes	$ 8,700	87%
Net Income	$ 1,000	10%

Two percentages are often picked out for special attention. One is the ratio of cost of goods sold to sales. In fact a subtotal called "Gross Profit" is often computed (sales less the cost of goods sold), and this is expressed as a percentage of sales. In the preceding example this would be 67%. The second percentage of interest is the ratio of total expenses to total revenues (87% in the example). This is sometimes termed *the* operating ratio. Because of the difficulty in determining what should and should not be included, the broader and more useful definition of operating ratio*s* is used in this text.

By comparing like firms, or the same firm in successive periods, significant changes can be observed by using the operating ratios. Thus, if selling expense is 20% of each sales dollar in 1957 and 35% of each sales dollar in 1958, the increase should be investigated.

All-Asset Earning Rate. The all-asset earning rate gives an indication of the efficiency with which the resources of the firm are being used. In order to eliminate the effects of the capitalization structure, the interest charge is not deducted in computing the earnings of the firm. Taxes may or may not be deducted, depending on the use of the rate when computed. The danger in not deducting taxes is that the rate of return thus obtained may be incorrectly assumed to be the return available to the owners of the enterprise. Some accountants advocate the elimination of noninterest-bearing current liabilities or the addition of an implicit interest chargeback to the income as computed for the earnings on assets financed by these assets. This is a complication that will be ignored here in order to prevent the confusion which accompanies this adjustment.

$$\text{All-asset earning rate} = \frac{\text{net income (before deduction of interest)}}{\text{average total assets used during period}}$$

The net income is divided by the average total assets used during the period. This average may be made exact by noting the specific dates on which assets are added or retired from service, or it may be taken as a simple average of the beginning and ending balances of total assets. The book figures should not be accepted as given but should be adjusted as needed.

Stock-Equity Earning Rate. The stock-equity earning rate gives an indication of how efficiently the investment of the stockholders is being used. There is a danger in not analyzing beyond this rate. A good stock-equity earning rate may be obtained by using a large amount of debt (this is called *trading on the equity*). While this may result in a high stock-equity earning rate, it will also increase the financial risk connected with running the enterprise.

$$\text{Stock-equity earning rate} = \frac{\text{earnings of stockholders}}{\text{average stockholders' equity}}$$

✓**Working Capital.** *Working capital* is a term which has two meanings. It may refer to total current assets or to the difference between current assets and current liabilities. The latter definition is more useful and will be used here.

$$\text{Working capital} = \text{current assets} - \text{current liabilities}$$

Book Value per Share of Common Stock. In recent years the book value per share of stock has lost much of its meaning. This is related to the inflation of the post World War II period, and certain accounting practices such as LIFO, "Cost or Market, whichever Is Lower," adherence to the original cost for fixed assets and investments, etc. Despite the validity of the suspicions directed against book value, the fault does not lie with book value itself, but with the conventions of reporting the financial position of a firm. The book value per share of stock does have significance when the "books" are kept in a significant manner or when the relevant information is supplied in supplementary reports.

$$\text{Book value per share of common stock} = \frac{\text{common stock equity}}{\text{number of shares outstanding}}$$

Earnings and Dividends per Share. Both the earnings and the dividends per share of common stock are meaningful to investors. Complications arise in the treatment of stock dividends, i.e., the issuance of additional shares of stock instead of cash disbursements. These additional shares are not income to the stockholders and thus should be excluded when computing dividends per share. They will, however, influence the number of shares outstanding.

$$\text{Earnings per share} = \frac{\text{earnings of stockholders}}{\text{number of shares outstanding}}$$

$$\text{Dividends per share} = \frac{\text{total cash dividends}}{\text{number of shares outstanding}}$$

Earning of Interest. The holders of bonds are interested in the security of their investment, and one measure of safety is the number of times the total interest is earned. This is called *times interest earned* and is computed by dividing the net income of the corporation (before the deduction of interest charges) by the total interest payments. While the bondholder is really interested in future earnings, the present earnings are frequently used.

Example

The income of the ABC Company before deducting interest is $200,000. There are 100 $1,000 bonds outstanding with a coupon rate of 4%. Compute the number of times the interest is earned.

Solution: The annual interest payments are $40 × 100, or $4,000. The interest is earned $\frac{\$200,000}{\$4,000} = 50$ times.

Because of difficulties in measuring income and because interest is paid out of funds, some analysts prefer to use funds generated by operations instead of using net income. The computation of funds generated by operations is explained in Chapter 20.

Investors in preferred stock have a problem analogous to that of the bondholders in that they expect a fixed payment. Thus they will make a computation to see how many times the preferred stock dividend is earned (net income minus interest charges are used in the numerator).

QUESTIONS AND PROBLEMS

19–1. The Exray Company

Required: Compute Quick Ratio, Current Ratio, Stock Equity Ratio, Operating Ratios, All Asset Earning Rate, Stock Equity Earning Rate, and Working Capital for the year 1954, or as of December'31, 1954.

THE EXRAY COMPANY

COMPARATIVE BALANCE SHEETS

	December 31 *1954*	*1953*
Cash	$ 38,000	$ 41,000
Accounts Receivable	65,000	35,000

Inventories	175,000	100,000
U. S. Treasury Notes (maturing February 10, 1954)	———	60,000
Prepaid Expenses	7,000	4,000
Land	70,000	40,000
Buildings	160,000	80,000
Machinery and Equipment	180,000	120,000
	$695,000	$480,000
Allowance for Uncollectibles	$ 2,000	$ 1,000
Allowance for Depreciation	55,000	35,000
Accounts Payable	48,000	34,000
Notes Payable (due June 30, 1955)	40,000	———
Common Stock	400,000	300,000
Retained Earnings	150,000	110,000
	$695,000	$480,000

THE EXRAY COMPANY

INCOME STATEMENT

FOR YEAR ENDING DECEMBER 31, 1954

Sales (net)		$200,000
Less:		
Operating Expenses *	$104,000	
Loss on Sale of Machinery **	1,000	
Taxes	35,000	$140,000
Net Income		$ 60,000
Dividends		20,000
Increase in Retained Earnings		$ 40,000

* Includes $25,000 of depreciation.

** The cost of the machinery sold was $8,000. The book value at the time of the sale was $3,000. The machinery was sold for cash.

19–2. The Rogers Company

Required: Compute the following for the year 1957: Quick Ratio, Current Ratio, Stock Equity Ratio, Operating Ratios, All Asset Earning Rate, Stock Equity Earning Rate, Working Capital, Book Value per Share, and Dividends per Share. The company issued the additional shares of stock on January 1, 1957, as a stock dividend.

THE ROGERS COMPANY

COMPARATIVE BALANCE SHEETS

	December 31	
	1957	*1956*
Cash	$120,000	$100,000
Accounts Receivable	173,000	120,000

Inventories	40,000	90,000
Machinery and Equipment	55,000	40,000
Bonds Payable, Discount	4,750	5,000
	$392,750	$355,000
Allowance for Uncollectibles	$ 2,000	$ 1,000
Allowance for Depreciation	6,000	4,000
Accounts Payable	40,000	50,000
Bonds Payable	100,000	100,000
Common Stock	150,000 *	50,000
Retained Earnings	94,750	150,000
	$392,750	$355,000

THE ROGERS COMPANY

INCOME STATEMENT

FOR YEAR ENDING DECEMBER 31, 1957

Sales	$300,000	
Less Allowance for Uncollectibles	3,000	$297,000
Expenses and Taxes		
Cost of Goods Sold	$200,000	
Operating Expenses	40,000	
Taxes	7,000	247,000
Net Income		$ 50,000
Interest Charges		5,250
Earnings of Stockholders		$ 44,750
Stock Dividends		100,000
Decrease in Retained Earnings		$ 55,250

* Represents 10,000 shares of common stock outstanding.

19–3. The Ithaca Gas Light Company

Required: Compute Quick Ratio, Current Ratio, Stock Equity Ratio, Working Capital, and Book Value per Share.

THE ITHACA GAS LIGHT COMPANY

POSITION STATEMENT

AS OF DECEMBER 31, 1957

Assets

Current		
Cash		$100,000
Marketable Securities		200,000
Accounts Receivable	$150,000	
Less Allowance for Uncollectibles	40,000	110,000

Inventories	40,000	
Prepaid Expenses	50,000	$ 500,000
Plant Assets		
Land	$100,000	
Buildings	150,000	
Equipment	450,000	700,000
Total Assets		$1,200,000

Equities

Current Liabilities		
Accounts Payable	$ 50,000	
Taxes Payable	140,000	
Interest Payable	10,000	$ 200,000
Long Term Liabilities		
Bonds Payable		400,000
Reserves		
Reserve for Depreciation	$150,000	
Reserve for Contingencies	100,000	
Reserve for Possible Future Price Decline	50,000	300,000
Stockholders' Equity		
Common Stock *	$200,000	
Retained Earnings	100,000	300,000
Total Equities		$1,200,000

* Represents 20,000 shares of common stock outstanding.

19–4. The Quick Company

The president of the Quick Company has made arrangements to obtain a loan from the City National Bank. One of the requirements of the loan is that the Quick Company have a current ratio of two to one as of the date of the loan, and three to one after the loan. The controller has made the following *pro forma* position statement for the date of the loan (May 15, 1958) which does not include the loan.

QUICK COMPANY
PRO FORMA POSITION STATEMENT
AS OF MAY 15, 1958

Cash	$210,000
Accounts Receivable (net)	40,000
Inventories	50,000
Plant Assets (net)	200,000
	$500,000
Accounts Payable	$100,000
Taxes Payable	150,000

Common Stock	60,000
Retained Earnings	190,000
	$500,000

A computation of the current ratio as of May 15 indicates a current ratio of 300,000/250,000, or 1.2 to 1.

There is not enough time to issue additional shares of common stock or long term debt securities.

Required

(a) What would you suggest be done in order to attain the desired current ratio of two to one?

(b) What does this suggest about the reliability of current ratios?

19–5. The Current Company

THE CURRENT COMPANY
POSITION STATEMENT
AS OF DECEMBER 31, 1957

Cash	$ 250,000	Accounts Payable	$ 100,000
Accounts Receivable ...	60,000	Taxes Payable	100,000
Inventories	90,000	Reserve for Depreciation	200,000
Plant Assets	600,000	Common Stock	100,000
		Retained Earnings	500,000
	$1,000,000		$1,000,000

Additional Information:

1. The company does not set up an allowance for uncollectible accounts. Past experience indicates that 5% of the accounts currently shown will not be collected.
2. The company uses a LIFO inventory procedure. The current market value of the inventory is $50,000.
3. The actual liability to the government for taxes is $250,000. The $100,000 is the result of subtracting $150,000 of government bonds which the company owns from the amount owed, $250,000.
4. Depreciation has been accrued without taking into consideration the factor of obsolescence. If this had been considered, the depreciation accrual for assets currently in use would be $100,000 greater.

Required: Compute the following ratios, before and after taking note of the additional information given: Quick Ratio, Current Ratio, and the ratio of Stockholders Equity to the Total Assets Employed.

19–6. The following questions apply to the annual report of the X Company. (Note to student: The annual report will be passed out in class or will be made available in the library.)

Required

(a) Compute the following ratios or percentages:
    Position Statement Ratios
        Quick Ratio
        Current Ratio
        Stock-Equity Ratio
    Income Statement Ratios, Operating Ratios
    Income, Position Statement Ratios
        All-asset earning rate
        Stock-equity earning rate

(b) Compute the following items:
        Working Capital
        Book Value per Share
        Earnings per Share of Common Stock
        Dividends per Share of Common Stock
        Times interest earned

(c) What additional financial (accounting) information do you desire, that is not presented in the annual report? Is there any significant financial information that is presented in the body of the report or in footnotes which is not incorporated into the financial statements? Write a brief critique of the annual report and the financial statements.

(d) Write a brief statement describing the financial condition of the Company. Make use of the ratios computed in part (a).

(e) Before forming an opinion as to the desirability of investing in this firm, what additional information would you desire?

19–7. On December 20 the management of the Hood Company held a conference. The following pro forma (predicted) statement was presented by the Controller.

THE HOOD COMPANY
POSITION STATEMENT (PRO FORMA)
AS OF DECEMBER 31, 1957

Cash	$100,000	Current Liabilities	$100,000
Accounts Receivable	40,000	Common Stock	300,000
Inventories	60,000	Retained Earnings	100,000
	$200,000		
Long-lived Assets (net)	300,000		
	$500,000		$500,000

The Controller also presented the pro forma current ratio and working capital computations. These two figures are particularly relevant because the company expects to be making a short term loan from a bank shortly.

$$\text{Current ratio} = \frac{\$200{,}000}{\$100{,}000} = 2 \text{ to } 1$$

$$\text{Working capital (net)} = \$200{,}000 - \$100{,}000 = \$100{,}000$$

The president of the firm was dissatisfied with the projected financial report because he had informally promised the loan officer of the bank a current ratio of three to one and net working capital of $100,000. He requested suggestions from the other members of management as to how to improve the current position of the firm by December 31, 1957.

One suggestion offered was to borrow money on a long-term loan or issue new stock. These suggestions were sound, but the president and the treasurer were of the opinion that neither of the suggestions could be carried out in the 10 days remaining in the year. Another suggestion was to postpone making purchases of raw material, etc. This suggestion was vetoed by the production manager on the grounds that inventories were already down to an operating minimum.

Required

(a) If you were the treasurer of this firm, what would you suggest?
(b) What does this problem suggest relative to the reliability of the current ratio?

19–8. The Large Automobile Company and the Current Utility Company have position statements as follows as of December 31, 1957:

THE LARGE AUTOMOBILE COMPANY

POSITION STATEMENT
AS OF DECEMBER 31, 1957
(Dollars in Thousands)

Cash	$ 450,000	Current Liabilities	$1,350,000
Securities	800,000	Long-Term Liabilities	650,000
Accounts Receivable	500,000	Stockholders' Equity	3,000,000
Inventories	950,000		
	$2,700,000		
Long-lived Assets (net)	2,300,000		
	$5,000,000		$5,000,000

THE CURRENT UTILITY COMPANY

POSITION STATEMENT
AS OF DECEMBER 31, 1957
(Dollars in Thousands)

Cash	$ 30,000	Current Liabilities	$ 80,000
Accounts Receivable	50,000	Long-term Liabilities	460,000
Materials and Supplies	10,000	Stockholders' Equity	460,000
Other (prepayments)	10,000		
	$ 100,000		
Long-lived Assets (net)	900,000		
	$1,000,000		$1,000,000

Required

(a) Compute and compare the following ratios of the two companies:
Quick Ratio
Current Ratio
Stock Equity Ratio

(b) Comment on the significance of the ratios for the two companies. Are the ratios comparable? If not, why?

19–9. The Tuck Company

THE TUCK COMPANY
POSITION STATEMENT
AS OF DECEMBER 31, 1957

Assets

Current		
Cash	$100,000	
Investments in Subsidiary Companies	400,000	
Accounts Receivable	200,000	
Inventories		
Materials and Supplies	150,000	
Construction of Plant in Progress *	100,000	
Prepaid Interest on Notes Payable	50,000	$1,000,000
Long-lived Assets (Cost)		
Land	$200,000	
Buildings	400,000	
Machinery	100,000	700,000
Investments, Tuck Company Stock		200,000
Goodwill		100,000
Total Assets		$2,000,000

Equities

Current Liabilities		
Accounts Payable	$ 60,000	
Taxes Payable	40,000	
Notes Payable (due on July 1, 1958)	500,000	$ 600,000
Long-Term Liabilities		
Bonds Payable (due 1975)		400,000
Reserves		
Reserve for General Contingencies	$100,000	
Reserve for Uncollectible Accounts	20,000	
Reserve for Deterioration and Obsolescence of Long-lived Assets	80,000	
Advances by Customers	15,000	
Reserve for Inventory Valuation **	25,000	240,000

Stockholders' Equity	
Capital Stock	500,000
Retained Earnings	260,000
	$2,000,000

* The company is having a new plant constructed. This represents payments to date.

** The company uses LIFO. This reserve is set up for the difference between the book figure for inventory of materials and supplies ($150,000) and the market value of the inventory.

Required: Compute the Quick Ratio, Current Ratio, and Stock Equity Ratio. Present a revised position statement prepared in good form.

19–10. The Foxy Corporation has been struggling along for a period of years, being neither profitable nor very well managed. Its financial statements for 1954 were as follows:

THE FOXY CORPORATION
POSITION STATEMENT
AS OF DECEMBER 31, 1954

Total Assets	$30,000,000
Current Liabilities	$ 1,000,000
Stock Equity (one million shares outstanding)	29,000,000
Total Equities	$30,000,000

INCOME STATEMENT FOR YEAR ENDING DECEMBER 31, 1954

Revenues	$40,000,000
Revenue Deductions	39,500,000
Net Income	$ 500,000

No dividends were paid in 1954, and the stock was selling for $5 per share (this was ten times earnings).

In the beginning of 1955 controlling interest in The Foxy Corporation was acquired by a group of dynamic investors. They immediately shuffled management around, but by the end of 1956 it was obvious that more drastic action would be needed if they were to make a profit on their investment. The stock was still earning $0.50 per share and selling at $5.00 per share, and there was no prospect of dividends, since all the cash being generated was being used to replace machinery.

In January of 1957 The Foxy Corporation acquired The Blue Chip Company. The Blue Chip Company had earned $2,000,000 in the year 1956. The acquisition was financed by the issuance of 5% debenture bonds. It cost The Foxy Company $30,000,000 to acquire 100% ownership of The Blue Chip Company. The projected financial statements of The Foxy Corporation for the year 1957 were as follows:

THE FOXY CORPORATION
PROJECTED POSITION STATEMENT
AS OF DECEMBER 31, 1957

Total Assets	$63,500,000
Current Liabilities	$ 1,000,000
Long-Term Debt Debentures	30,000,000
Stock Equity	32,500,000
Total Equity	$63,500,000

THE FOXY CORPORATION
PROJECTED INCOME STATEMENT
FOR THE YEAR ENDING DECEMBER 31, 1957

Revenues	$100,000,000
Revenue Deductions (expenses and taxes)	97,500,000
Net Income	$ 2,500,000

The reasoning of the investors who controlled The Foxy Corporation was as follows: The income would increase to $2,500,000, or $2.50 per share. This was based on the assumption that The Blue Chip Corporation would continue to earn $2,000,000 per year (there was reason to believe the present management would continue to run the new division), and the old Foxy Corporation would continue to earn $500,000 per year.

With earnings of $2.50 per share the cash dividends could be resumed, and the price of the stock of The Foxy Corporation could be expected to increase to $25.00 per share (ten times earnings).

Prior to purchase, The Blue Chip Corporation had a stock equity ratio of 100%.

Required: Analyze the situation before and after the acquisition of The Blue Chip Company. Would you expect the price of the stock to increase to $25.00 per share? Explain.

19–11. The following is a preclosing trial balance of the Kalb Company.

THE KALB COMPANY
TRIAL BALANCE
AS OF DECEMBER 31, 1958

Accounts Payable		$ 20,000
Accounts Payable, Allowance for Purchase Discounts	$ 1,000	
Accounts Receivable	35,000	

Accounts Receivable, Allowance for Sales Returns		500
Accounts Receivable, Allowance for Uncollectibles		2,500
Bank	40,000	
Land	10,000	
Building	50,000	
Building, Accumulated Depreciation		18,000
Cash	2,000	
Cost of Goods Sold	30,000	
Depreciation Cost	1,000	
Interest Charge	500	
Interest Payable		250
Investments	3,500	
Merchandise	6,000	
Notes Payable (due March 1, 1959)		10,000
Salaries, Administrative	10,000	
Salaries, Selling	5,000	
Sales		70,000
Sales, Adjustment for Uncollectibles	3,000	
Sales, Returns	1,000	
Capital Received from Stockholders		40,000
Retained Earnings		42,000
Taxes	12,000	
Taxes Payable		6,000
Wages and Salaries Payable		750
	$210,000	$210,000

Required: Prepare an income statement and position statement from the trial balance.

19–12. The Kane Company

THE KANE COMPANY
TRIAL BALANCE
AS OF DECEMBER 31, 1958

Accounts Payable		$ 10,000
Accounts Receivable	$ 30,000	
Accounts Receivable, Allowance for Sales Discounts		1,000
Accounts Receivable, Allowance for Sales Returns		400
Accounts Receivable, Allowance for Uncollectibles		2,600
Adjustment of Depreciation, Prior Years	10,000	
Bank	45,000	
Building	80,000	
Building, Accumulated Depreciation		50,000
Cash	5,000	
Cost of Goods Sold	50,000	
Depreciation Cost	2,000	
Dividends on Stock	4,000	

Interest Charges	3,000	
Interest Payable		1,500
Land	10,000	
Investments	51,000	
Marketable Securities	6,000	
Merchandise	20,000	
Notes Payable		30,000
Revenues, Dividends and Interest		2,500
Revenues, Sales		120,000
Sales, Adjustment for Uncollectibles	3,000	
Sales Discounts	2,000	
Sales Returns	1,000	
Capital Received from Stockholders		20,000
Retained Earnings		123,000
Taxes, Current Year	4,000	
Taxes, Adjustment of Prior Years	20,000	
Taxes Payable		22,000
Wages and Salaries	40,000	
Wages and Salaries Payable		3,000
	$386,000	$386,000

Required: Prepare an income statement and a position statement from the trial balance.

19–13. On January 15, 1958, Company A purchased all the common stock of Company B for $20,000. At the time of purchase, the position statements of the two companies were as follows:

	Company A	*Company B*
Other Assets	$50,000	$30,000
Investment in Company B	20,000	
	$70,000	$30,000
Liabilities	$30,000	$10,000
Capital Stock	25,000	15,000
Retained Earnings	15,000	5,000
	$70,000	$30,000

Required: Prepare a worksheet for a consolidated position statement at the time of purchase of the stock.

19–14. (Continuing Problem 19–13.) As of December 31, 1958, the position statements of the two corporations were as follows:

	Company A	*Company B*
Other Assets	$70,000	$40,000
Investment in Company B	20,000	
	$90,000	$40,000

Liabilities	$20,000	$ 5,000
Capital Stock	25,000	15,000
Retained Earnings	45,000	20,000
	$90,000	$40,000

Company B owes Company A $3,000. This has been recorded by both corporations.

Required: Prepare a worksheet for a consolidated position statement as of December 31, 1958.

19–15. (Continuing Problem 19–13.) As of December 31, 1959, the position statements of the two corporations were as follows:

	Company A	*Company B*
Other Assets	$ 80,000	$55,000
Investment in Company B	20,000	
	$100,000	$55,000
Liabilities	$ 30,000	$15,000
Capital Stock	25,000	15,000
Retained Earnings	45,000	25,000
	$100,000	$55,000

Company B has in inventory $3,000 of goods purchased from Company A. The income of Company A associated with the transaction was $1,200.

Required: Prepare a worksheet for a consolidated position statement as of December 31, 1959.

19–16. On June 1, 1958, Company X purchased 70% of the common stock of Company Y for $35,000. At the time of purchase the position statements of the two companies were as follows:

	Company X	*Company Y*
Other Assets	$145,000	$60,000
Investment in Company Y	35,000	
	$180,000	$60,000
Liabilities	$20,000	$10,000
Capital Stock	50,000	30,000
Retained Earnings	110,000	20,000
	$180,000	$60,000

Required: Prepare a worksheet for a consolidated position statement at the time of purchase of the stock.

19–17. (See Problem 19–16.) As of December 31, 1958, the position statements of the two corporations were as follows:

	Company X	*Company Y*
Other Assets	$155,000	$70,000
Investments	35,000	
	$190,000	$70,000
Liabilities	$ 40,000	$15,000
Capital Stock	50,000	30,000
Retained Earnings	100,000	25,000
	$190,000	$70,000

Required: Prepare a worksheet for a consolidated position statement as of December 31, 1958.

20

Preparation of the Funds Statement

A FEW YEARS ago attention of the investment analyst shifted from the position statement to the income statement. In recent years another financial statement has increased in importance. It is known by various names, such as "Statement of Funds," "Statement of Changes in Working Capital," and "Statement of Financial Operations." This report is becoming more and more popular because it helps explain why, despite the presence of high earnings, dividends cannot be increased (the same applies to wages, executive salaries, and expansion programs). By projecting into the future, the report can be used to anticipate changes in working capital. Because of these uses management also has a vital interest in this report.

What is the funds statement? It explains the change of *working capital* from one point in time to another. A variant of the funds statement shows the sources and applications of *cash* rather than working capital. While this second type of report is very useful, it is of less use for general financial statement analysis than is a statement of sources and applications of working capital (hereafter *working capital* and *funds* will be used interchangeably). The cash balance is too easily influenced by postponing purchases, payments, etc. Working capital is somewhat less subject to changes of this kind; thus a report of changes in working capital is generally more useful.

There is no general agreement as to the specific form that the funds statement should take. A variety of forms are found in practice, and several methods of presentation will be illustrated later in this chapter.

Operating Income and Funds from Operations. Funds from operations is one of the main sources of funds of an enterprise. The funds from operations, however, will only rarely be equal to the operating income. Unfortunately there is often confusion as to how to compute the funds from operations if the income of the period is given.

To compute the net funds from operations, it is necessary to add back to the operating income those revenue deductions which did not utilize funds (decrease current assets or increase current liabilities); and to subtract those revenue or other income items which did not generate funds (increase current assets or decrease current liabilities). An alternative treatment is to start with revenues that increase working capital and then deduct only those expenses, losses, and taxes which utilize funds. The disadvantage of this last procedure is that it does not tie in directly with the income figure reported in the income statement.

The main items that may necessitate adjustments to income to obtain the funds from operations are:

Depreciation of Fixed Assets
Depletion of Natural Resources
Amortization of Patents and Other Intangibles
Loss on Sale or Retirement of Noncurrent Assets
Gain on Sale of Noncurrent Assets (the cash received from the sale is included in another section of the statement)
Accumulation of Bond Discount (on bonds payable)

Example

Computation of funds from operations:

Given the following conventional income statement, compute the funds from operations.

Sales		$50,000
Less:		
Labor, etc.	$35,000	
Depreciation	12,000	
Total Expenses		47,000
Net Income		$ 3,000

The funds from operations may be computed by using either of two techniques. One adds back to income those expenses which did not use funds. The other subtracts from revenues only those expenses which did use funds. The funds from operations will be equal for the two procedures.

First Procedure		*Second Procedure*	
Income Reported	$ 3,000	Revenues	$50,000
Add back expenses not using funds (Depreciation)	12,000	Subtract expenses using funds	35,000
Funds from Operations	$15,000	Funds from Operations	$15,000

The first procedure has the advantage of tying-in to the income figure for the period, but it has the disadvantage of having to add back depreciation (this results in confusion as to the relationship of depreciation and funds). The second procedure has the advantage of being straightforward. A comparison of the two procedures should prove beyond all doubt that depreciation is not a source of funds.

Depreciation of Fixed Assets. The accounting entry to accrue depreciation is a debit to depreciation expense and a credit to the fixed asset account (usually a contra account such as allowance for depreciation is used). The asset that has been decreased is not a current asset but a long-lived asset. Thus working capital is not affected by the accrual of depreciation, and depreciation should not be deducted from revenues if we are computing funds from operations. If it has been subtracted, i.e., if we are starting from the income figure rather than from the revenue figure, it is necessary to add back to income the amount of depreciation deducted from income, in order to work toward the funds from operations figure.

It is often stated that funds are obtained from depreciation charges, depreciation allowances, or depreciation reserves. This is obviously an incorrect observation. *Funds are not generated by charging or accruing depreciations; they are created by sales.* Charging more or less depreciation will have no effect on the amount of working capital. The depreciation charge will affect the income of the period, and it will affect the amount that has to be added back to income to compute the funds from operations.

The depletion charge encountered in industries that are of an extracting nature (mining, oil, etc.) should be treated in a manner similar to that of depreciation. Since the depletion charge does not result in a decrease of current assets, it must be added back to income to obtain funds from operations.

At this point it is possible and desirable to make a generalization. The revenue deduction arising from the amortization of any long-lived asset must be added back to income to obtain the funds from operations figure.

Loss or Gain on Sale of Noncurrent Assets. The two most common classifications of long-lived assets that are likely to be sold are fixed assets (land, buildings, or equipment) and investments. The loss or gain arising from the sale of these assets must be eliminated in order to compute the funds from operations. The loss must be added to income (since it has been subtracted), and the gain subtracted (since it has been added). By doing this the effect of these items is eliminated.

Any *current assets* received from the sale of long-lived assets are, of course, included and described in the fund statement. To include the *gain* also would be double counting.

Example

A fixed asset with a book value of $10,000 is sold for $12,000 cash.

(a) What is the gain?
(b) What current assets are generated by the transaction?
(c) What adjustment must be made to the income for the period to obtain the funds from operations?

Solutions

(a) The gain is $2,000.
(b) Cash of $12,000 is generated by the transaction.
(c) The $2,000 gain must be subtracted from income (assuming that it has been included in other income). Not to subtract the $2,000 would mean that funds of $14,000 would be reported to have been generated, but that only $12,000 of working capital was actually received (the $14,000 is equal to the $2,000 plus $12,000).

Example

A fixed asset with a book value of $10,000 is sold for $8,000 cash.

(a) What is the book gain or loss?
(b) What current assets are generated by the transaction?
(c) What adjustment must be made to the income for the period to obtain the funds from operations?

Solutions

(a) The book loss is $2,000.
(b) Cash of $8,000 is generated by the transaction.
(c) The $2,000 book loss must be added back to income (assuming that it had been subtracted to obtain the income figure). Not to add back the $2,000 would mean that a loss, which did not utilize funds, was subtracted in computing funds from operations. Assume that the sales were $50,000, depreciation $12,000, other expenses $28,000, and the loss from sale of fixed assets $2,000. Either of the two following solutions would be correct.

Income		$ 8,000
Add Back:		
Depreciation	$12,000	
Book Loss	2,000	14,000
Funds from Operations		$22,000

Sales	$50,000
Less:	
Other Expenses	28,000
Funds from Operations	$22,000

Bond Discount. The normal entry for recording a year's interest accrued on a bond payable which had been issued at a discount is:

Interest Charge	$40	
Bond Discount		$ 2
Interest Payable		38

The deduction from the revenue (or income) is $40, but the decrease in working capital (by an increase in current liabilities) is only $38. The difference of $2 is caused by the fact that long term liabilities have been increased by $2 (the credit to bond discount effectively increases the long term debt). Thus the interest charges for the period are not equal to the decrease in funds.

The adjustment that should be made is to add $2 back to income, if interest charges have been subtracted to obtain income. If interest charges have been reported separately as an utilization of funds, then only $38 of interest charges would be reported as using funds.

This same sort of analysis would also have to be made by the holders of long term debt purchased at a discount, if the discount is being accumulated.

Other Sources of Funds. The funds from operations are one of the most important sources of funds in a business entity. The other more important sources are the raising of funds by issuing new securities, both long term debt and stock equity. This includes common and preferred stock, bonds, and long term notes.

A less important source, although it can be relevant in any one year, is the sale of long-lived assets or the reclassification of special cash "funds." This includes the sale of investments (but not marketable securities classified as current assets), land, buildings, and equipment. Cash set aside for building purposes, debt retirement, etc., is sometimes classified as a noncurrent asset. Thus, when the fund is liquidated, any residual cash may be a source of funds. As explained in a previous section, the gains from the transactions that involved long-lived assets are excluded, but the current assets which were acquired are included.

A relatively minor source of funds is the funds arising from the fact that in a manufacturing operation, depreciation finds its way into current assets via the application of overhead. Thus in a very limited sense depreciation can be a source of funds.

Utilization of Funds. Funds are most commonly utilized to purchase long-lived assets (land, buildings, equipment, investments, patents, etc.) or to retire long term debts. Other uses of funds include the payment of dividends on stock and the retirement of different types of stock.

Transactions Not Involving Working Capital. Most of the problems arising in the preparation of funds statements are not connected with those transactions which are sources of funds or applications of funds, but are the result of transactions which do not affect funds. A transaction of this nature is the accrual of depreciation and depletion. The creation of "surplus" reserves, whether or not identified as retained earnings, are also of this nature. The setting up of an account such as "Reserve for Income Taxes of Future Years" does not involve working capital; thus it should not affect the fund statement. A stock dividend (not a dividend on stock) is another transaction that does not directly affect the working capital position of the firm.

Many transactions will not change the total amount of funds but will affect the balances of individual fund items. For example, the payment of accounts payable will reduce two fund accounts, but the net change in funds is zero. The payment reduced the current asset cash, but the current liability accounts payable was reduced an equal amount.

Another type of transaction does not explicitly change the working capital, but there is an *implicit* source and application of funds. Assume that bonds are issued to the owner of land in exchange for the land. Working capital has not been touched by this transaction, but many accountants would say that there has been a source of funds (the issuance of bonds) and application of funds (purchase of land) even though the formal exchange of cash was bypassed. This is an interesting question worthy of discussion, but in order to avoid complexity, the rule will be followed that a "fund" transaction must affect a current account.

Transactions that recognize expenses are fund transactions if the cost factor which is expiring has been considered a current asset. If the solution for funds from operations is to start from income, this type of transaction does not have to be explicitly considered, since the expense has already affected the income figure. If funds from operations are being computed, starting from sales, then expenses that used funds have to be subtracted when computing the funds from operations.

Summary of Funds Transactions. The fund position of a firm is affected by transactions involving the gaining of revenue, as evidenced by the receipt of a current asset or the reduction of a current liability, and by transactions involving:

Current Assets or Current Liabilities and Noncurrent Assets
Current Assets or Current Liabilities and Noncurrent Equities

The fund position of a firm is *not* affected by transactions involving:

Current Assets or Current Liabilities only
Long Term Assets or Long Term Equities only

Suggested Forms of Funds Statement. Since it is desirable to keep accounting reports simple, the following sample is probably one of the more suitable forms of the funds statement.

XYZ COMPANY
FUNDS STATEMENT
FOR THE YEAR ENDING ________

Sources of Funds	
From Operations:	
Income	$xxxxx
Plus expenses of a nonfund nature which have been deducted	xxxxx
Total from Operations	$xxxxx
New Financing, Stocks	xxxxx
New Financing, Bonds	xxxxx
Sale of Fixed Assets	xxxxx
Total Sources	$xxxxx
Applications of Funds	
Retirement of Long-Term Debt	$xxxxx
Purchase of Fixed Assets	xxxxx
Dividends on Stock	xxxxx
Total Applications	$xxxxx
Net Increase (decrease) in Funds	$xxxxx

There are many variations of this form, and of course only some of the possibilities in terms of transactions have been illustrated. The main criticisms of this presentation are that it does not give sufficient information and that the treatment of depreciation is misleading. There are other subtotals that might be useful, but they are not essential, since the person using the statement may rearrange the information to suit his specific needs. The danger of having too many subtotals, thereby detracting from the one or two more significant figures, should be avoided. The second criticism is more valid. The treatment of nonfund items is a tricky matter and should be handled with care. Adding back the expenses of a nonfund nature, such as depreciation, could give credence to the popular fallacy that depreciation is a source of funds. A possible solution would be to show only the "Funds from Operations" total and not to show the derivation of that amount from the income figure except in a footnote.

The following form is one method of overcoming the second of the two criticisms. Some accountants use this same approach but include several more subtotals. Note that the problem of depreciation is solved by leaving it off the statement entirely.

XYZ CORPORATION
FUNDS STATEMENT
FOR THE YEAR ENDING ________

Revenues	$xxxxxx
Less Expenses, Taxes, and Interest which use funds	xxxxxx
Funds from Operations	$xxxxxx
Other Sources	
New Financing, Stocks	xxxxxx
New Financing, Bonds	xxxxxx
Sale of Fixed Assets	xxxxxx
Total Sources	$xxxxxx
Applications of Funds	
Retirement of Long-Term Debt	$xxxxxx
Other applications	xxxxxx
Total Applications of Funds	$xxxxxx
Net Increase (decrease) in Funds	$xxxxxx

Techniques for Preparing Funds Statements. There are various techniques for preparing the material that goes into the funds statement. One of the simplest techniques was developed by Professor William J. Vatter. The following procedure has been adapted from the method used by Professor Vatter. It makes use of the fact that the only relevant transactions are those which affect noncurrent accounts. If the transaction affects only current accounts, the effect on working capital is zero. Thus attention is focused on the changes occurring in noncurrent accounts. The causes for the changes in the noncurrent account are traced to find if the current accounts have been affected.

The technique assumes implicitly that the funds statement is being prepared without having access to the accounting records and detailed information of the firm. If this information is available, the procedure followed will be different in one respect. The entries made to the noncurrent accounts will be the entries made in the books of record. They will be summarized but not changed. This procedure will supply more complete information than could be obtained from the beginning and ending position statements, income statement, and miscellaneous information, the use of which tends to net-out various transactions.

The mechanics of the procedure are as follows:

1. Set up "T" accounts for all *noncurrent* balance sheet accounts, showing the opening balances.

2. Set up two additional "T" accounts. One is a *working capital* account for items affecting current assets or current liabilities. The other is the *operations* account used to clear those items which affect the funds from operations.
3. For each noncurrent account make the entry (or entries) necessary to bring the beginning balance into agreement with the known ending balance. If a current account is affected, make the entry to the *working capital* account. If the funds from operations is affected, make the entry to the *operations* account.
4. Close the *operations* account to the *working capital* account (the amount transferred is the funds from operations).
5. The debit balances of the working capital account are sources of funds. The credit balances are applications of funds.
6. Prepare the funds statement, using the information obtained from the *working capital* account.

Instead of using "T" accounts, this same general technique may be employed by using a worksheet. Both procedures will be illustrated in the following problem:

Illustration: Preparation of a Funds Statement

XYZ COMPANY
POSITION STATEMENTS
FOR JANUARY 1 AND DECEMBER 31, 19–

	January 1	*December 31*
Cash	$ 40,000	$ 44,400
Accounts Receivable	10,000	20,700
Inventories	15,000	15,000
Land	4,000	4,000
Buildings	20,000	16,000
Equipment	15,000	17,000
Allowance for Depreciation	(5,000)	(2,800)
Patents	1,000	900
Total Assets	$100,000	$115,200

	January 1	*December 31*
Current Liabilities	$ 30,000	$ 32,000
Bonds Payable	22,000	22,000
Bonds Payable, Discount	(2,000)	(1,800)
Capital Stock	35,000	43,500
Retained Earnings	15,000	19,500
Total Equities	$100,000	$115,200

Additional Information

1. Income for the period, $10,000.
2. A building that cost $4,000, and which had a book value of $1,000, was sold for $1,400.

3. The depreciation charge for the period was $800.
4. There was a $5,000 issue of common stock.
5. Cash dividends of $2,000 and a $3,500 stock dividend were declared.

Solution

Working Capital

(1)	$ 1,400	(2)	$2,000
(6)	5,000	(8)	2,000
(a)	10,700		

Allowance for Depreciation

(1)	$3,000	√	$5,000
		(3)	800

Operations

(3)	$ 800	(1)	$ 400
(4)	100		
(5)	200		
(7)	10,000	(a)	10,700

Patents

√	$1,000	(4)	$100

Land

√	$4,000		

Bonds Payable

		√	$22,000

Buildings

√	$20,000	(1)	$4,000

Bonds Payable, Discount

√	$2,000	(5)	$200

Equipment

√	$15,000		
(2)	2,000		

Capital Stock

		√	$35,000
		(6)	5,000
		(9)	3,500

Retained Earnings

		√	$15,000
(8)	$2,000	(7)	10,000
(9)	3,500		

Explanation of Entries

1. Records the sale of the building, which cost $4,000. Credit building $4,000, debit the allowance for depreciation for $3,000, debit working capital to record the receipt of $1,400, and credit operations to accomplish the elimination of the $400 from the income in order to compute the funds from operations. Note that this is a balanced logical accounting entry.
2. Records the purchase of $2,000 of equipment.
3. Records the accrual of depreciation for the year.
4. Records the amortization of patents.

5. Records the accumulation of bond discount (note the debit to operations for $200).
6. The issuance of $5,000 of capital stock.
7. The income for the period of $10,000 (operations is debited).
8. The cash dividends of $2,000.
9. The stock dividend of $3,500.
    (a) To close the funds from operations to working capital: Note that the ending balance in each "T" account agrees with the account balances contained in the December 31 position statement. Entries were made in each account so that this would occur. In some problem situations the most logical transaction has to be assumed. For example, the purchase of the $2,000 of equipment was not explicitly described. In this case the transaction has to be assumed by the person preparing the funds statement (if the ending balance is $2,000 greater than the beginning balance, then it is assumed that $2,000 of equipment was purchased).

The funds statement may be obtained from the working capital account. The debit entries of this account are sources, and the credit entries are applications of funds.

XYZ COMPANY
FUNDS STATEMENT
FOR YEAR ENDING DECEMBER 31, 19–

Sources of Funds		
From Operations *	$10,700	
New Financing	5,000	
Sale of Building	1,400	
Total Sources		$17,100
Application of Funds		
Purchase of Equipment	$ 2,000	
Cash Dividend on Stock	2,000	
Total Applications		$ 4,000
Net Increase in Working Capital		$13,100

* The $10,700 was obtained in the following manner:

Income for Period		$10,000
Less Book Gain on Sale of Fixed Assets		400
		$ 9,600
Plus: Depreciation	$800	
Bond Discount	200	
Amortization of Patents	100	
Nonfund Deductions		1,100
Funds from Operations		$10,700

XYZ COMPANY

STATEMENT OF CHANGES IN WORKING CAPITAL
FOR YEAR ENDING DECEMBER 31, 19–

	January 1	*December 31*	*Increase (Decrease)*
Cash	$40,000	$44,400	$ 4,400
Accounts Receivable	10,000	20,700	10,700
Inventories	15,000	15,000	
Total Current Asests	$65,000	$80,100	$15,100
Current Liabilities	$30,000	$32,000	$ 2,000
Net Working Capital	$35,000	$48,100	$13,100

Note that the increase in working capital is equal to the amount indicated in the funds statement as the change in working capital.

Some accountants prefer to prepare funds statements by using worksheets. The following solution is designed to illustrate a worksheet solution, making use of the same techniques as those previously illustrated. The funds statement may be obtained from the transactions column opposite the "Working Capital" and "Operations" accounts.

XYZ COMPANY

WORKSHEET FOR FUNDS STATEMENT
FOR YEAR ENDING DECEMBER 31, 19–

	January 1, 19—		Transactions		December 31, 19—	
Working Capital *	$35,000	$	(1) $ 1,400	(2) $ 2,000	$48,100	$
			(6) 5,000	(8) 2,000		
			(a) 10,700			
Operations			(3) 800	(1) 400		
			(4) 100	(a) 10,700		
			(5) 200			
			(7) 10,000			
Land	4,000				4,000	
Buildings	20,000			(1) 4,000	16,000	
Equipment	15,000		(2) 2,000		17,000	
Allowance for Depreciation		5,000	(1) 3,000	(3) 800		2,800
Patents	1,000			(4) 100	900	
Bonds Payable		22,000				22,000
Bonds Payable, Discount	2,000			(5) 200	1,800	
Capital Stock		35,000		(6) 5,000		43,500
				(9) 3,500		
Retained Earnings		15,000	(8) 2,000	(7) 10,000		19,500
			(9) 3,500			
Total	$77,000	$77,000	$38,700	$38,700	$87,800	$87,800

* The debit entries of the transactions column (opposite working capital) are sources of funds. The credit entries are applications of funds.

Managerial Uses of the Funds Statement. The funds statement has been defined in this chapter as a statement of sources and applications of working capital. This type of statement is useful, since it tells where the working capital (current assets less current liabilities) is coming from and where it is being used. It is by necessity a summary, but it does indicate what is happening to the current position of the firm and why it is happening. This is of importance to management and investors.

While the funds statement as defined is useful, management needs additional information. Even of more importance than the change in working capital is the change in cash. Explanations of why the cash balance has changed are desirable, and forecasts of what is going to happen in the future to cash and working capital are often essential. This information is necessary in order to ensure that the proper amount of cash will be on hand for operations of the future periods. As productive facilities are enlarged, the treasurer of the corporation must ensure that cash is on hand to pay for the construction of the facilities. As the facilities are placed into operation, new workers must be paid, materials purchased, etc. All these items require that cash be available long before the product being produced is sold.

The forecasting of cash is commonly thought of as being a budgeting problem (it is discussed further in Chapter 25). However, it is also directly related to the funds statement, since the method of presentation and computation are very much similar.

Summary. The funds statement is useful to management, but statements of changes in cash may be even more useful. Also, the reporting of what has happened is desirable, but in planning for the future, estimates of sources and applications of cash and working capital have to be made for the coming accounting periods.

QUESTIONS AND PROBLEMS

20–1. The Exray Company

Required: Prepare a statement of sources and applications of funds, and a schedule of changes in working capital. See Prob. 19–1 for necessary data.

20–2. The Rogers Company

Required: Prepare a statement of sources and applications of funds, and a schedule of changes in working capital. See Prob. 19–2 for necessary data.

20–3. Financial analysts suggest that "cash flow" is of great significance. Cash flow is defined as the income of the period plus depreciation. Comment on the significance and usefulness of this concept.

20–4. The Reno Company

Required: Prepare a

Statement of sources and applications of funds
Schedule of changes in working capital

THE RENO COMPANY

COMPARATIVE BALANCE SHEETS

	December 31 *1957*	*1956*
Cash	$ 40,000	$ 43,000
Accounts Receivable	63,000	33,000
Inventories	165,000	100,000
Prepaid Expenses	7,000	4,000
Investments, Common Stock of Subsidiary	75,000	60,000
Land	70,000	40,000
Buildings	100,000	80,000
Machinery and Equipment	180,000	120,000
	$700,000	$480,000
Allowance for Uncollectibles	$ 2,000	$ 1,000
Allowance for Depreciation	55,000	35,000
Accounts Payable	48,000	34,000
Preferred Stock	40,000	
Common Stock	400,000	300,000
Retained Earnings	155,000	110,000
	$700,000	$480,000

THE RENO COMPANY

INCOME STATEMENT

FOR YEAR ENDING DECEMBER 31, 1957

Sales	$300,000	
Gain on Sale of Machinery *	500	$300,500
Expenses and Taxes		
Operating Expenses **	$100,000	
Taxes	40,500	140,500
Net Income		$160,000
Dividends on Stock		20,000
Increase in Retained Earnings from Operations		$140,000

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* The cost of the machinery sold was $8,000. The book value at the time of sale was $1,500. The machinery was sold for cash.

** Includes $26,500 of depreciation.

THE RENO COMPANY
RECONCILIATION OF RETAINED EARNINGS
FOR 1957

Retained Earnings January 1, 1957		$110,000
Plus:		
Earnings of Subsidiary	$ 15,000	
Increase resulting from operations	140,000	155,000
		$265,000
Less:		
Stock Dividend	$100,000	
Write-off of obsolete inventory	10,000	110,000
Retained Earnings December 31, 1957		$155,000

20–5. The president of the Flush Corporation asked his controller for a statement of sources and applications of funds. He had heard a speech at a local businessmen's group which praised this type of report. For many years, he had been puzzled by the fact that in some periods cash would decrease despite good earnings, and in other periods cash would increase despite the fact that the results of operations were a loss. He hoped a funds statement would eliminate this confusion.

The controller prepared the following statement:

THE FLUSH COMPANY
STATEMENT OF SOURCES AND APPLICATIONS OF FUNDS
FOR YEAR ENDING DECEMBER 31, 1957

Sources		
Operations:		
Income	$500,000	
Plus items not using funds	150,000	$ 650,000
Issue of Stock		200,000
Issue of Bonds		250,000
		$1,100,000
Applications		
Purchase of Plant Assets		$280,000
Payment of Mortgage Debt		120,000
Dividends		400,000
		$800,000
Increase in Funds		$300,000

The president looked over the report carefully and then tried to tie it into the change in cash indicated in the comparative position statements. Much to his surprise he found that cash actually decreased $110,000 during the period. He called in the controller, who gave the following explanation: "A statement of funds is a statement of sources and applications of working capital, not cash." The working capital had indeed increased by $300,000. The president recognized the need for such a report but asked that a statement be prepared to show the sources and applications of liquid assets. Liquid assets were to include cash, accounts receivable, and marketable securities. The president reasoned that all these items could be used to satisfy claims of creditors without disrupting the normal operation of the business (the accounts receivable could be sold to factors).

The current asset section of the position statement for December 31, 1957, was as follows (the current liabilities for the two periods were equal):

	December 31, 1957	*December 31, 1956*
Cash	$ 190,000	$300,000
Marketable Securities	150,000	60,000
Accounts Receivable (net)	100,000	200,000
Inventories	470,000	100,000
Prepaid Expenses	100,000	50,000
	$1,010,000	$710,000

Required

(a) Prepare the statement the president desires.

(b) Prepare a statement explaining the change in cash.

(c) Comment on the relative usefulness of the report prepared by the controller and the two reports required above in parts (a) and (b).

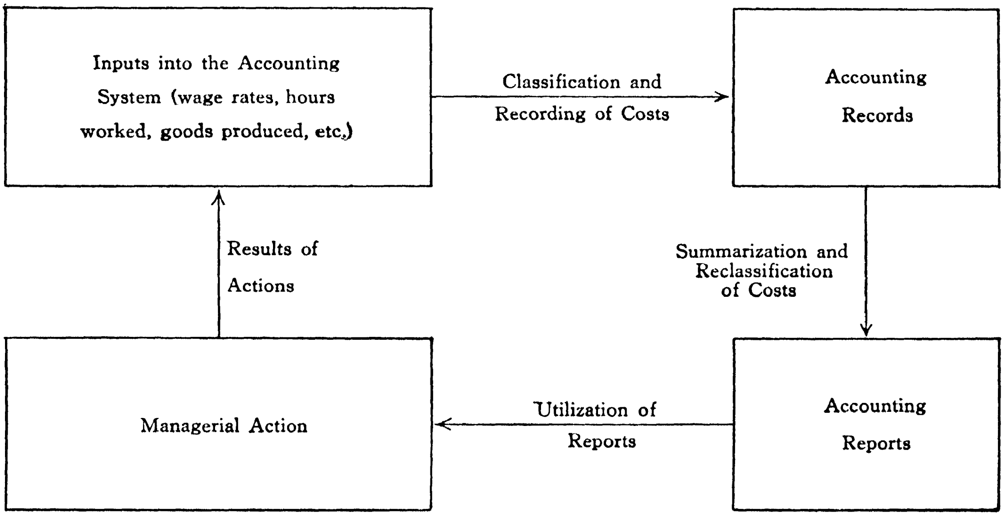
II

Managerial Accounting

21

Organization for Cost Control and Recording of Costs

THE FOCUS OF attention of managerial accounting is on cost control and the uses of cost information. The managerial accounting cycle of operations may be illustrated as follows:


Inputs into the Accounting System (wage rates, hours worked, goods produced, etc.)
Classification and Recording of Costs
Accounting Records
Summarization and Reclassification of Costs
Accounting Reports
Utilization of Reports
Managerial Action
Results of Actions

This chapter introduces the managerial accounting cycle of operations by first describing the organizational setting in which the accounting system exists. The second step is to develop useful classifications of costs. The third step is to survey the technical problem of the mechanical means used to accomplish the accumulation and classification of the costs. The problems of preparing the reports and using the information will be reserved for later chapters.

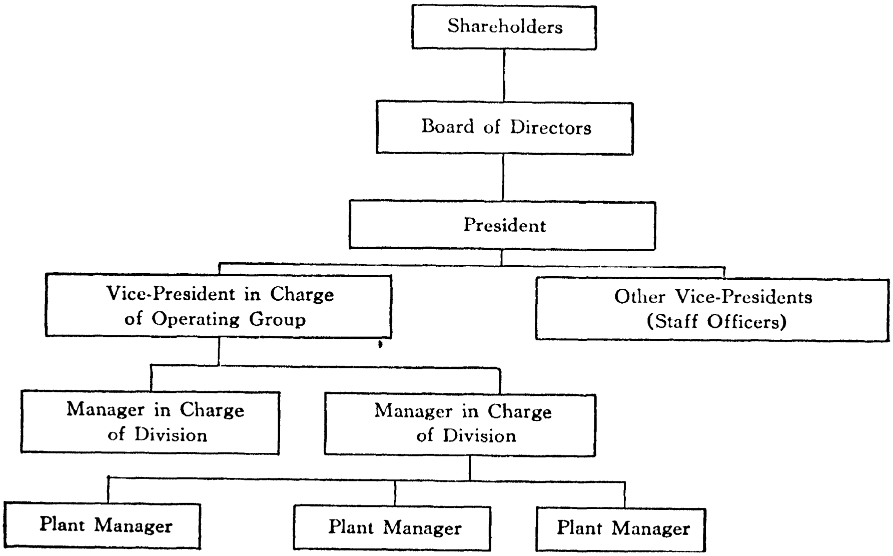
Organization of a Large Corporation. Understanding the organization of a large corporation helps us to understand managerial accounting and what the accountant is accounting for. At the very top of the organization are the owners or shareholders. The shareholders exercise control by electing the board of directors, who in turn choose the executives responsible for administering the general policies decided on by the board of directors.

The amount of control that the individual shareholder will effectively wield is limited by the relative size of his holdings, but as a group the stockholders are powerful. The "proxy" battles which are frequently publicized in the newspapers are actually fights for the votes of the stockholders so that one or another group may control the board of directors, and thus control the corporation.

The liaison between the board of directors and operating management is frequently the president of the firm, although in many firms the connecting link is maintained by the use of committees such as the "Executive Committee," and "Finance Committee." These committees will frequently include members of management who are also on the board of directors. In some situations the chairman of the board of directors will also be the chief executive officer of the corporation, although he may or may not also be called the "president" of the firm. Thus the same man who is directly responsible to the stockholders may also be in charge of the everyday running of the corporation.

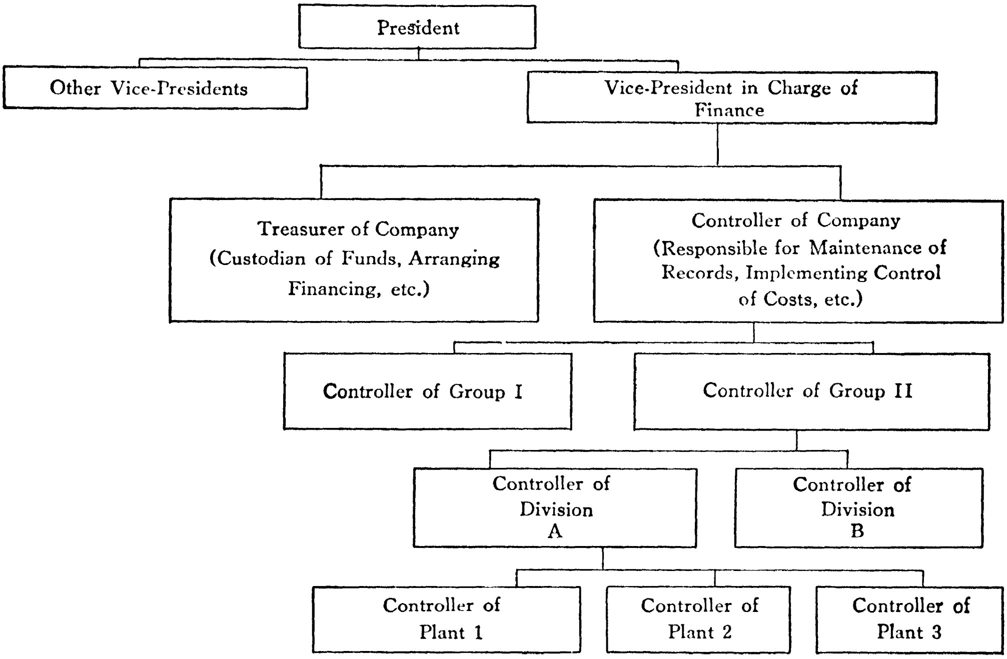
Working under the president (chief executive officer) will be various vice-presidents. If the corporation is organized along decentralized divisional lines, then the list of vice-presidents would include those men in charge of operating groups or divisions, as well as those in charge of staff or functional operations.

The line, or operating, organization of a corporation may be set up in the following manner:


Shareholders
Board of Directors
President
Vice-President in Charge of Operating Group
Other Vice-Presidents (Staff Officers)
Manager in Charge of Division
Manager in Charge of Division
Plant Manager
Plant Manager
Plant Manager

Among the "Other Vice-Presidents" presented in the foregoing chart will be one or more vice-presidents who may be called *accountants.* These executives are staff officers, since they are only indirectly associated with the production of the end product and are more concerned with supplying information to the operating personnel.

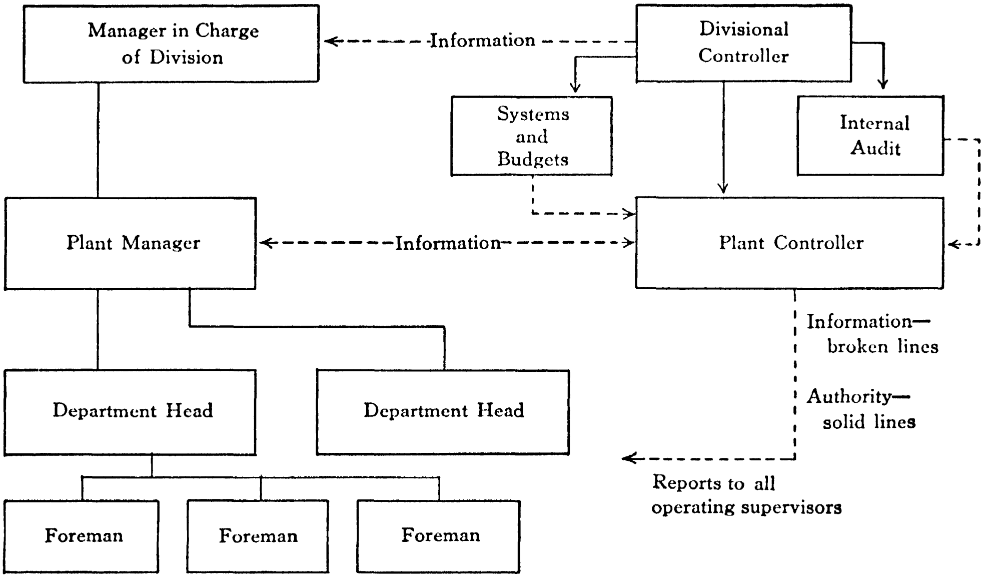
That part of the organization concerned with the staff function, accounting, may be thus:


President
Other Vice-Presidents
Vice-President in Charge of Finance
Treasurer of Company (Custodian of Funds, Arranging Financing, etc.)
Controller of Company (Responsible for Maintenance of Records, Implementing Control of Costs, etc.)
Controller of Group I
Controller of Group II
Controller of Division A
Controller of Division B
Controller of Plant 1
Controller of Plant 2
Controller of Plant 3

Note that the "Custodianship" and "Recording" of the company's cash is separated. This division of responsibilities is part of the company's "Internal Control." Internal control refers to the various procedures set up to help prevent waste, fraud, and theft of the company's assets. The exact duties of the treasurer and the controller will vary from company to company, but this division between the custodian and recorder of cash transactions should exist at all levels of operations.

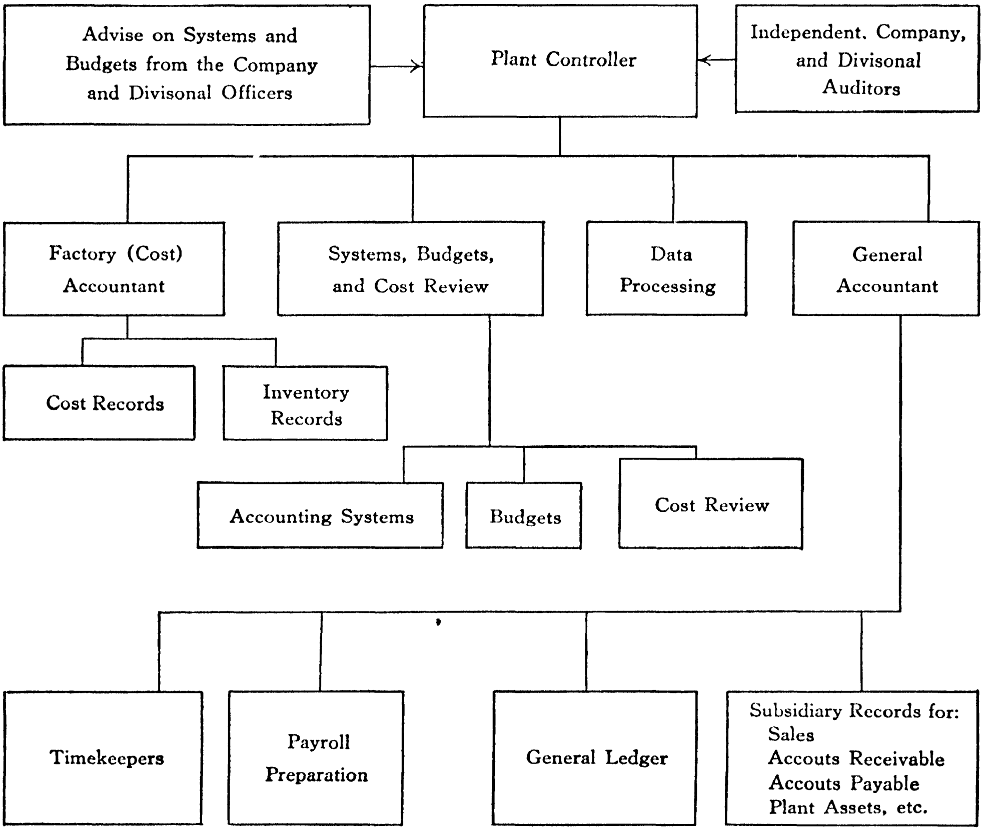
To be more meaningful, the two organization charts illustrated here should be combined. To avoid unnecessary confusion, the following chart shows only the organization of the accounting department and the line organization at the divisional and plant level.

In this example the plant controller supplies information to the plant manager, but he is directly responsible to the divisional controller. If the plant controller is placed under the authority of the plant manager (as he often is), the accounting reports to top management may be somewhat less reliable. The man whose efficiency is being measured, the plant manager,


Manager in Charge of Division
Information
Divisional Controller
Systems and Budgets
Internal Audit
Plant Manager
Information
Plant Controller
Information— broken lines
Authority— solid lines
Department Head
Department Head
Reports to all operating supervisors
Foreman
Foreman
Foreman

would be in a position to dictate the methods used to measure that efficiency. For example, obsolete material may be maintained in inventory rather than being written off to expense.

The next organization chart shows in detail the organization under the


Advise on Systems and Budgets from the Company and Divisonal Officers
Plant Controller
Independent, Company, and Divisonal Auditors
Factory (Cost) Accountant
Systems, Budgets, and Cost Review
Data Processing
General Accountant
Cost Records
Inventory Records
Accounting Systems
Budgets
Cost Review
Timekeepers
Payroll Preparation
General Ledger
Subsidiary Records for: Sales Accouts Receivable Accouts Payable Plant Assets, etc.

plant controller. The organization will not be the same for each company. Some companies do much of their accounting at the central office and do very little at the individual plants. Other companies have decentralized the accounting function, and each individual plant is practically self-sufficient and is a separate accounting entity. The choice of the degree of decentralization will depend on the size of the plants and the extent to which the individual plants can make use of labor-saving accounting machines.

The preceding charts are by no means complete or applicable to all corporate organizations. Several important departments are left off the charts completely; for example, the production control department, which controls the ordering of inventory and scheduling of production, could be included, since it supplies the accounting department with information and uses accounting reports. Another important department is the manufacturing engineering department. This department sets the manufacturing standards used in accounting for costs and also determines the methods to be used in production. Without this information the accounting department cannot record costs so that they can be used for control purposes.

Summary of Organization for Cost Control. The meanings of the various job tasks will become clearer as the reader progresses through the text, but the following brief descriptions may be of some assistance in understanding the organization charts of the controller's department.

Cost Records: records the manufacturing costs incurred and the cost of product being manufactured.

Inventory Records: records the materials and supplies on hand.

Accounting Systems: installs and improves the methods used to record and report accounting information.

Budgets: prepares budgets used for forecasting, decision-making, and control of costs.

Cost Review: reviews the actual costs incurred compared with what they should have been for the amount of product produced. Attempts are made to explain the differences.

Timekeepers: summarizes time cards of workers and compares the total from the time cards to the total of time reported by the individual foreman.

Payroll: prepares the pay checks and records the total payroll cost for each period. Summarizes the timekeepers' records (different individuals may be assigned to these tasks).

Accounts Receivable, Accounts Payable, etc.: maintain the various subsidiary or detailed records necessary for the operation of the plant. For example, the accounts receivable section records in detailed records the amounts which the individual customers owe.

General Ledger: maintains the general ledger. This is the *summary* record of all financial transactions. It is also the record which shows in total that information shown in detail elsewhere. For example, the amount owed by customers is recorded in detail by the Accounts Receivable section in a subsidiary record, but the total amount owed is recorded in the general ledger.

Data Processing: implements the application of electronic and electric accounting machines to the accounting problems of the unit.

The Classification and Recording of Costs

One problem which has plagued accountants is how to accumulate costs in all the desirable classifications and still keep the clerical staff at a reasonable size. In the past the problem had to be solved by sacrificing some of the information which might have been made available. In the future the problem may well be solved by mechanical and electronic computers. Thus the accountant will be able to classify costs in any manner he wishes and to obtain speedily the information in the form he desires.

It is interesting to note some of the different possible ways costs may be recorded. Many of the classifications overlap, but there are important distinctions. Some of the classifications are useful for recording purposes, but others are useful only when the specific problem to be solved is known.

Classifications useful for recording costs as well as for decision-making:

Responsibility (division, plant, department, or other areas of responsibility)
Job, Process, and Product (these are usually referred to as "systems," but they are also methods of classifying costs).
Direct and Indirect Costs
Fixed, Variable, and Semi-variable Costs
Natural and Functional Classifications

Classifications not usually used for recording purposes but commonly used for decision-making:

Out-of-pocket vs. Sunk Costs
Avoidable vs. Unavoidable Costs

Relevant vs. Irrelevant Costs
Controllable vs. Noncontrollable Costs
Marginal and Incremental (or differential) Costs

This list is by no means all-inclusive, but it does give an indication of the various ways in which costs may be thought of. The reader should realize that costs which are relevant for some decisions will not be relevant for others. While exact definitions are not essential, the reader must know how the terms are likely to be used and the different situations in which they are likely to be useful.

Classification for Recording Costs

Area of Responsibility. The recording of costs by division or by plant is necessary with multi-divisional or multi-plant organizations, especially where the accounting is done by a central accounting organization. To be useful, the various costs must be classified according to the location where they were incurred. This is also true when we are dealing with one plant organized on a departmental basis. The objective of classifying costs in this manner is to identify all costs according to where they are incurred so that the *responsibility for the cost may be established.* Establishing responsibility for costs is the *first step toward controlling costs,* and the primary function of any cost system is to control costs.

Job, Process, and Product. Manufacturing costs may be accumulated by job (the costs of each specific production order are accumulated separately), manufacturing process, and (or) by type of product. The differences of these procedures will be explained in detail in Chapter 23, at this point it is merely necessary to realize that a choice is available. In some cases costs will be classified by job (a special turbine to be built) and by process (the cost of various processes necessary to produce the turbine).

Direct and Indirect Costs. Certain costs can be easily identified with specific products or processes. These costs are *direct costs.* Costs that cannot be easily identified with product or process are called *indirect costs.* It is not unusual for the accountant to restrict the classification "direct" to direct labor and direct material. Even such costs as the glue holding the product together may be classified as an indirect cost, not because it could not be identified with a specific product, but because it cannot be *easily* identified. The materiality of the item should be taken into consideration. A physical component of the product being made may have a small unit value, and the cost of treating the item as a direct cost may be excessive when compared with the benefit gained.

The borderline between direct and indirect costs is very cloudy and often depends on the frame of reference. The salary of a foreman may be a direct cost of the plant and may be directly identified with a specific department, but if that department produces several products, the salary of the foreman will be an indirect cost when we are interested in determining the cost of each product.

For decision-making purposes, the accountant's classification of direct and indirect costs is not very useful. An indirect cost may be just as relevant as a direct cost in making a decision. The indirect cost may be variable in nature and out-of-pocket (for example, power costs), or it may be a fixed cost and sunk (for example, building depreciation). Thus to describe a cost as being an indirect cost tells little about that cost and lets us know only that it cannot be directly (or readily) identified with the end product (or the process or the department).

Fixed, Variable, and Semi-variable Costs. For decision-making purposes this is one of the most useful classifications of costs. Product-pricing and level of production decisions are based on the information supplied by this cost classification. The ability to control costs also relies upon a knowledge of how the costs should react to changes in the level of production.

A variable manufacturing cost is one that will vary in total amount directly with production. If production increases 10%, the variable cost will increase 10%. Examples of variable manufacturing costs are direct labor, direct material, and the power necessary to run the machines, although under certain conditions even some of these costs are not purely variable (direct labor workers may not be laid off immediately if production slackens).

A fixed manufacturing cost is a cost that is constant in total amount over wide ranges of production. Thus the president's salary is fixed, as is the depreciation of the factory. If production continues to increase so that one factory is inadequate, a second factory may be built. Once built, the depreciation of this second factory is also a fixed cost. Thus, while depreciation of factories is a fixed cost, it too may increase if production passes a certain point. This characteristic of fixed cost (i.e., that it is frequently not absolutely fixed), creates the need for the classification of semi-variable costs. Fixed costs are fixed relative to the level of production, but they may change from period to period (for example, salary increases may be given to foremen).

A semi-variable cost will increase in a discontinuous manner. Thus only two foremen may be required for normal production, but if another five laborers are hired, another foreman is required. Thus the need for foremen may be related to direct labor, but it may not be directly proportional to the number of workers.

Natural Classification and Functional Classification of Costs. Labor cost can be classified according to its natural classification, i.e., *labor,* or its functional classification; for example, *manufacturing.* The natural classification can be divided into direct and indirect labor, and then further classified by the exact nature of the labor; for example, material handler, packer, shipper, etc. Other examples of natural classifications of costs are material, supplies, taxes, and depreciation. The functional classification includes selling and administrative costs as well as manufacturing costs. The choice between natural and functional classifications carries over to the income statement. The expenses on the income statement may be classified by their natural or functional classifications.

Classifications Not Usually Used for Recording Purposes

Many of the items discussed in the following sections overlap, but all have their uses. There are hairline distinctions that are more useful in making decisions than for definitional purposes. Thus "Sunk Costs" and "Unavoidable Costs" are very similar, but there is a difference. The difference is useful when it is realized that some costs which are not out-of-pocket costs (i.e., they are sunk) are still avoidable. Thus the depreciation of a building is a fixed and sunk cost, but it may be avoided if a buyer can be found for the building. It is generally impossible for the accountant to use these classifications for recording purposes. The classification in most cases will depend on the decision being made.

Out-of-Pocket vs. Sunk Costs. Out-of-pocket costs require a utilization of current resources, usually cash or near cash. Sunk costs do not require a utilization of current resources. Examples of sunk costs are depreciation, amortization of patents, and depletion of natural resources. Out-of-pocket costs may be fixed (the president's salary) or variable (material or labor). Sunk costs are usually fixed, but they may also be variable (depreciation of a truck on a production or mileage basis). In some cases a sunk cost may be avoidable (for example, a building sold at a profit avoids building depreciation).

Avoidable vs. Unavoidable Costs. These terms are used by the accountant with the same meaning as the reader is accustomed to encountering. The main pitfall is in assuming that all avoidable costs are variable and out-of-pocket and that all unavoidable costs are sunk. The president's salary is generally unavoidable, but it is also out-of-pocket. The one true generalization is that unavoidable costs are fixed.

Relevant vs. Irrelevant. The purpose of this classification is to point up the fact that not all costs are relevant for specific decisions. Thus the book depreciation or book value of a machine currently being used is not relevant in making the decision whether or not to replace it. In measuring a firm's ability to survive short-run adversity, only the out-of-pocket costs are relevant. In pricing a bid for a government contract, only variable and certain semi-variable costs are relevant. Thus, for each decision, the business manager must determine which costs are relevant.

How many executives, when faced with the decision of whether or not to replace a long-lived asset, first dial the accounting department to find out if the asset being replaced is fully depreciated? The cost of the asset being replaced is a "sunk cost" (which will usually be incurred whether the asset is used or retired), and the depreciation charged or not charged does not affect the replacement decision. Something akin to depreciation can affect the decision, namely, the decrease in salvage or resale value. This is a relevant cost and should be considered.

The following example will attempt to illustrate why the extent of depreciation is not relevant in making a replacement decision. The complication that money has value over time has been left out of the illustration in order to avoid an unnecessary complication, but it obviously should be included in an actual decision-making situation.

Illustration

Assume that management is considering the replacement of an asset that cost $40,000, and which is 75% depreciated (net book value is $10,000), with a new piece of equipment which costs $50,000. The new asset will result in a saving of labor and material over a 5-year period of $56,000. The resale value of the old equipment is equal to the removal cost (no net salvage).

Should the asset be replaced? Two possible solutions are offered here. One includes the depreciated cost of the old asset, the other ignores this cost. To simplify the illustration interest is not taken into consideration.

	Correct Procedure (excludes depreciated cost)	*Incorrect Procedure (includes depreciated cost)*
Indicated Gross Savings	$56,000	$56,000
Less:		
Cost of New Asset	50,000	50,000
Depreciated Cost of Old Asset		10,000
Net Saving (Dis-saving)	$ 6,000	($ 4,000)

One procedure (the correct) argues for replacement; the other (the incorrect) argues in favor of retention of the old asset. Let us see what happens when we follow the two procedures. Assume that revenues for the 5-year period are $100,000. This figure is net of all expenses except those factors being considered in this example:

	Results of Operations	
	Correct Decision	*Incorrect Decision*
Net Revenues	$100,000	$100,000
Less:		
Write-off of Old Asset	$ 10,000	$ 10,000
Depreciation of New Asset	50,000	
Additional Costs Incurred (because new machine was not purchased)		56,000
Total Deductions	$ 60,000	$ 66,000
Net Income	$ 40,000	$ 34,000

The financial position of the firm that followed the correct procedure of ignoring the depreciated cost of the old asset is $6,000 better off than the position of the firm that followed the incorrect procedure of including the depreciated cost in the replacement calculations. To make a proper replacement decision, it is necessary to compare the value of the savings with the cost of the new asset. The undepreciated cost of the asset being replaced does not affect the decision.

Opportunity Costs. The principle of opportunity costs is very important to the analysis of accounting data and to business decision-making. It defines the cost of one course of action in terms of the opportunities which are given up in order to carry out that course of action. If an asset can be used to perform only one function, and it cannot be used in other ways or sold as scrap, the opportunity costs of that asset are zero. Thus, the opportunity costs of using the underground gas pipe of a gas company in the city of Chicago are zero because the pipe is going to carry gas and nothing but gas in Chicago. As long as the revenues from carrying the gas are greater than the incremental costs connected with delivering the gas, it will be desirable for the company to continue to deliver the gas. The costs of using the gas pipe are zero because there are no other alternative opportunities. In a theoretical sense, as well as physical sense, the costs of the gas pipe are sunk.

A machine used to make product A will have an opportunity cost if it can also make product B. For example, assume that a period's production of B can be sold for $10,000 and that the costs which vary directly with production are $8,000. The opportunity cost of not producing product B is $2,000. The proceeds that are forsaken by producing A instead of B are actually a cost of producing A. The opportunity cost principle is extremely useful in deciding on alternative uses of productive facilities.

Illustration

A machine is currently being used to make product A, which has a price of $1.50 per unit and a cost (which varies with production) of $1.10 per unit. The depreciation of the machine has not been included in the unit cost because it is considered to be a fixed cost. The machine could be used to make product B, which could be sold for $2 per unit and which has variable costs of $1.20 per unit. Is the machine depreciation relevant in making the decision whether or not to continue producing product A?

Answer: The depreciation of the machine is not relevant, but the opportunity cost of not producing product B is relevant. We must know how many units of product B can be produced per period in order to know the exact opportunity cost per period.

Controllable vs. Noncontrollable Costs. This concept is important because, if properly applied, it will help avoid much confusion in the area of cost control. It is generally accepted that a person should be held responsible for only those costs which he can control. A corollary of this is that reports to junior managers should contain only those costs which they control. Thus a foreman of an operating department would not receive a report comparing actual building depreciation with budgeted depreciation, since the foreman cannot control the rate of building depreciation. The inclusion of this or like items serves to detract from those items that the foreman can control. The plant manager is responsible for the most efficient utilization of the factory building; thus, the report measuring his efficiency would include building depreciation.

Marginal and Incremental (or Differential) Costs. The marginal cost is the cost added by producing one more unit. The incremental cost (or differential cost) is the cost added by producing more than one unit. Both definitions are extremely important, since many decisions are based on marginal or incremental costs.

The accountant often takes a practical short cut and assumes that the incremental cost is equal to the variable costs times the number of units to be added, plus any fixed (or semi-variable) costs which have to be added to produce the additional units. This ignores changes in efficiency, but otherwise it is a useful approximation.

Distinguishing between Costs and Expenses. A *cost* is an asset value that has been consumed within the company, but which, although it has changed form, may still be traced within the company. Thus the labor of a man on the production line in a sense may be traced to the product on which he is working, and the same is true of factory depreciation.

An *expense* is a *cost* or *asset* that has expired in the gaining of revenues. It has gone forth from the company. Thus, when the manufactured goods are shipped to the customers, all the costs that went into the production of those goods become expenses.

It must be admitted that the accounting profession does not universally recognize this distinction in its terminology. Thus "Cost of Goods Sold" is used rather than the more exact "Expense of Goods Sold" or "Cost of Goods Sold Expense."

Recording Accounting Information

At this point it should be apparent to the reader that costs may be recorded and used in many different ways. The problem remains of actually getting the costs recorded so that the information is readily available for use by management when it is needed. There are four basic methods of recording data, and there are an almost infinite number of combinations of the four basic methods. Information may be recorded by using:

1. Manpower
2. Key-driven machines
3. Electrical—mechanical punch-card equipment
4. Electronic data-processing equipment

For small organizations a combination of manpower and key-driven machines will usually be sufficient. Key-driven machines refer to typewriters, adding machines, calculators, and bookkeeping machines. These machines enable the manpower to be used more effectively than if only pencil and paper were used and are the first steps toward mechanization of the office force.

If the number of transactions being recorded is large enough, the next step toward mechanization may be warranted. This is the use of electrical-mechanical punch-card equipment. Up to about 1950 this type of equipment was the last word in office mechanization. Reference to an "automatic" accounting system at that time meant a system using punch cards. The basic principle of the system is simple. Information is recorded on the punch card by the operator of a machine which codes information on a card by punching a series of holes in it. Each hole has a meaning which is translated by another machine. Thus to record the incurrence of direct labor of the finishing department in the Albany plant, it would be necessary to punch five different series of holes, one each to identify the cost as: a manufacturing cost, direct labor, labor incurred in the finishing department, incurred in the Albany plant, the amount of cost. It may also be desirable to record additional information such as the product being manufactured and the shift or foreman in charge of the shift.

To save time and effort, a "mark-sensing" system is frequently used to record the source information on a card. Following this procedure, the foreman marks a card with a special pencil to indicate the facts of the above example (manufacturing cost, direct labor, finishing department, Albany plant, and the amount of the cost incurred). When this card is inserted into a machine, the machine translates the marks on the one card into holes on another. This procedure has the advantage of reducing both paper work and the chance of human error. Errors are bound to occur if the information is transferred manually from document to document.

When information is desired from the punched cards (such as the total direct labor costs of the finishing department), the cards are mechanically sorted, any calculations are made (such as the extension of hours worked by the hourly wage), and then the cards motivate a machine which types a "run" or list with the desired information on it. These steps are not all performed by the same machine but by different machines for each function. Thus there will be a sorting machine, a calculator, a card punch, etc.

The electrical-mechanical punch-card systems are by far the most common semi-automatic accounting systems in use today, but they have several disadvantages. The several machines required for the complete system are costly in terms of monthly rental or original cost. The installation also requires considerable space. Whether the cost of the equipment is greater or less than the cost of clerical help necessary to accomplish comparable work depends on the facts of the individual situation. The large cash outlay required to purchase the machines may actually be less than the present value of salaries that might be saved by reducing the clerical staff. It is necessary for management to analyze the costs of the two or more alternatives. This decision must be reviewed periodically, for the decision will change as the costs of the equipment, the cost of clerical help, and the size of the enterprise change. Key-driven machines may be adequate for a firm doing $1,000,000 of sales and employing 100 employees, but if the sales increase to $20,000,000 and the number of employees increases to 600, it may be desirable to install an electrical-mechanical punch-card system.

In many cases the decision to use this type of equipment has been made, not because of direct cost saving, but rather because the use of the equipment allowed new reports to be made and old reports to be obtained more promptly. More prompt and better information, used properly, can result in better informed decision-making by management, which in turn should result in higher profits.

Electronic Data-Processing Equipment. During World War II the armed forces used mechanical computers to solve problems in predicting the location of a ship or airplane so that guns could be aimed to fire a projectile where the target was going to be, rather than where it just had been. By the end of the war, planes were going faster than the computer could compute, so scientists went to work and came up with an electronic computer which could solve the problem of aiming guns no matter how fast the target traveled. These electronic computers are cousins to the electronic data-processing equipment which is available to the business community today. The electronic data processors are capable of receiving, storing, and processing vast quantities of information. When information is desired, the electronic computer can search its "memory" unit (this memory unit may take the form of a tape or another type of magnetic storage device) at a fantastic speed to obtain the desired information.

The use of electronic data-processing equipment in industry has barely started. Progress has been handicapped by the high cost of the equipment and by ignorance of management as to how to use this new marvel. The cost of the equipment will decrease as manufacturers and scientists improve the design and make use of improved production techniques (for example, the expanded use of transistors will help decrease the cost). The ignorance of management is certainly excusable in view of the fact that so little is known of the capabilities of these machines. There is a tremendous need for business managers who understand the capabilities and limitations of these machines, or for machine experts who understand the needs of the business manager. For the electronic computers to be used properly, the person in charge of programming (setting up the control instructions for the computer) should know the needs of management as well as have the technical knowledge necessary to record the information.

QUESTIONS AND PROBLEMS

21–1. Assume that you are controller for a University. What type of information would you want to know about wages paid for:

(a) Teaching
(b) Grading papers
(c) Repairs

21–2. Why is it desirable that the geographical location of a cost (division, plant, department, etc.) be known?

21–3. Why is it desirable that a cost be classified as to job? To process? To product?

21–4. The distinction between direct and indirect costs is frequently very elusive. Determine which of the following costs are direct costs (a) from the point of view of the plant, (b) from the point of view of Department One, (c) from the point of view of the foreman in charge of making Product A in Department One:

General cleaning supplies.

Wages of oiler (services all machines in Department One).

Wages of worker on production line. His machine produces components for Products A and B, but all his output is produced and used in Department One.

Wages of assembly line worker. Works only on Product A in Department One.

Cost of heating the plant.

Cost of machines used both by Department One and Two.

Cost of machine used only by Department One.

21–5. Are all fixed costs sunk costs? Unavoidable? Noncontrollable? Explain.

21–6. Are all variable costs out-of-pocket? Avoidable? Controllable? Explain.

21–7. The salary of the president of the firm is usually considered a fixed cost. Is it a relevant cost in trying to price the product for sale to the government? Is it a relevant cost in the decision as to whether or not to sell the organization? Explain.

21–8. Certain costs are controllable and certain costs are noncontrollable. This is a meaningless statement unless we define what portion of the organization is being discussed. Explain.

21–9. Distinguish between marginal and incremental (or differential) costs.

21–10. What is the technical distinction between a cost and an expense? Is this distinction consistently observed? Do you think it would be helpful if it were?

21–11. Mr. Jones is trying to decide whether or not to trade in his automobile for a new one. He finds his 1948 Chevrolet has no trade-in value at this date (he paid $1,500 in 1948). Relative to the decision at hand, discuss the costs which are relevant and irrelevant.

21–12. The ABC Manufacturing Company is considering expanding by acquiring a plant currently being operated by the XYZ Company. The XYZ Company has submitted the following list of costs for normal level of operations:

Direct Labor	$100,000
Direct Material	200,000
Indirect Manufacturing Costs, Fixed	
Plant and Equipment Depreciation	150,000
Salaries of Personnel (includes allocation of central office salaries, $100,000)	200,000
Indirect Manufacturing Costs, Variable	40,000
	$690,000

The plant is so designed that it can produce only widgets. Widgets sell for a price of $1 per unit. The widget industry is very competitive and a price change is very unlikely. At a normal level of operations the plant produces 500,000 widgets.

The XYZ Company has operated the plant efficiently, and it is unlikely that the ABC Company could introduce any additional efficiencies. Selling costs are nominal. The ABC Company would not have to add to its central office staff.

Required

(a) In computing the maximum price that the ABC Company should offer for the plant, what "income" figure should be used (assume normal sales)?

(b) If the XYZ Company cannot sell the plant, should they close it down? Explain.

21–13. The president of the ABC Company has suggested to his controller that costs be classified and recorded according to whether or not they are relevant. What should be the controller's action?

21–14. The president of the ABC Company, in an effort to find out why profits were down, closely inspected the variable costs incurred and compared the actual costs with the costs which should have been incurred at actual level of operations. He ignored the fixed cost classification, since the fixed costs are "fixed." Discuss.

21–15. If an income statement were prepared, using a functional classification, what information would not be disclosed?

21–16. The following questions apply to a family of five who own their own home (with mortgage). Name some home costs which are:

Out-of-pocket	Sunk
Avoidable	Unavoidable
Controllable	Noncontrollable

21–17. The following schedule was prepared for the president of the ABC Company:

Production	Fixed	Variable	Total Costs
1,000 units	$500	$1,000	$1,500
1,001	500	1,001	1,501
2,000	800	2,000	2,800

Required

(a) At 1,000 units of production what is the marginal cost of producing one more unit?

(b) At 1,000 units of production what is the differential cost of producing 1,000 more units?

(c) Why may fixed costs increase from $500 to $800 as production is doubled? Are these costs really "fixed"? What label would you suggest?

21–18. The Miner Company is considering the elimination of an outlying plant. The elimination would result in increased efficiency because of savings in transportation of material and parts. The present plant, which is 40 miles from the main plant, would be replaced by a plant adjacent to the main plant. In preparing an analysis of the pros and cons of the elimination, one of the researchers suggested that a portion of the salaries of the executives of the plant and headquarters should be considered, i.e., the portion reflecting the amount of time spent traveling during company hours between the plants. Another researcher said, "The salaries should not be considered because they are a fixed cost. The executives would be paid the same amount whether they traveled or not; thus the cost is not relevant."

Required

(a) Should the time the executives spent traveling be considered in making the decision whether or not to replace the present plant?

(b) What other information would you want if you were going to make the decision?

21–19. The Miller Company is considering the sale of the physical assets of a subsidiary company. The president of the Miller Company has requested an analysis of the costs of the subsidiary and has been given a breakdown of costs (assuming normal operations) into fixed and variable classifications.

Required

(a) Name some "fixed" costs that would be avoidable if the subsidiary were sold.
(b) Name some "fixed" costs that would be avoidable if the subsidiary were retained but not operated.
(c) Name some costs that would continue even if the subsidiary were not operated (assuming it were not sold).

21–20. Should the controller of a plant be placed under the authority of the plant manager? Explain.

21–21. The Hall Company

The Hall Company makes and sells automobile gasoline tank caps. The caps are manufactured in two plants, one in Detroit and the other in Plainfield, New Jersey. The entire production of the Detroit plant is sold to automobile manufacturers. The production of the Plainfield plant is split between automobile manufacturers and spare part wholesalers. The central office of the company is in Detroit.

The company has the following officers:

- President
- Vice-President:
  - Sales
  - Production
  - New Products and Research
  - Purchasing
  - Personnel
- Controller
- Treasurer

The personnel at the two plants include:

- Production Manager
- Plant Manager
- Plant Controller
- Production Control Manager
- Manufacturing Engineering Manager
- Factory Accountant
- General Accountant
- Cashier
- Budget Officer
- Personnel Manager
- Necessary Clerical Personnel
- Necessary Supervisory Personnel, Manufacturing (Foremen)
- Necessary Factory Workers

Required: Prepare an organization chart for the Hall Company (Detroit plant only). Indicate lines of authority with solid lines, and lines of information with broken lines.

22

Manufacturing Overhead

ALL COSTS CONNECTED with the manufacturing process, other than direct labor and direct material, are frequently classified by the accountant as *manufacturing overhead.* This differs somewhat from the economist's definition of overhead, which includes only fixed costs. The difference in the two definitions is not important as long as it is recognized which definition is being used. In this chapter manufacturing overhead refers to both fixed and variable manufacturing costs that cannot be readily identified with a specific product, process, or job.

Costs Included in Manufacturing Overhead. Manufacturing overhead includes a wide range of costs. They will be fixed and variable, sunk and out-of-pocket, avoidable and unavoidable, and so on. The following list gives some idea of the variety of the costs:

Building Depreciation Cost
Heating Cost
Repair Cost
Indirect Labor: Cleaners, Electricians, Shippers, etc.
Supplies: Cleaning supplies, small tools, gloves, etc.
Taxes: Payroll taxes (the payroll taxes on direct labor are often treated as overhead for practical reasons)
Cafeteria Cost
Foreman's Salary
Cost Accounting Department Cost

Overhead (or Burden) Centers—Establishing Responsibility. Overhead costs, no less than other costs, must be controlled. To accomplish this end and also the goal of sensible allocation of costs to product, various overhead or burden centers are established. There will be at least one overhead center for each department. The overhead costs are first recorded in these overhead centers. This process is called *distributing* the costs. The distribution of costs is accomplished by identifying where the costs were incurred. Note that this is a matter of identification, not arbitrary allocation. For example, if labor costs were incurred in five departments, the time each worker spent in each department would be tabulated and would be the basis of the *distribution* of labor costs.

The next step is to assign all overhead costs to operating departments. Some of the costs have been directly identified with an operating department by the cost distribution procedure. However, many overhead costs have been distributed to service departments, and these costs have to be *allocated* to operating departments. The allocation of the costs is often made by using arbitrary bases, and the allocated costs have no use for purposes of cost control.

After the allocation of service department costs to the operating departments, the next step is to *absorb* or *apply* the overhead costs to product.

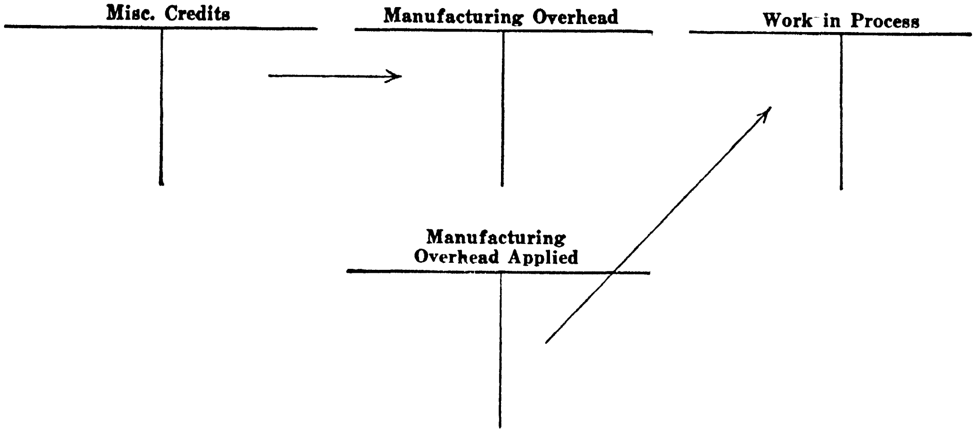
It should be noted that there are actually three steps in recording overhead:

1. Charging overhead to burden centers (responsibility centers). This may be called *cost distribution.*
2. *Allocating* the costs of service departments to operating departments.
3. *Absorbing* or *applying* the overhead to product.

The overhead is first charged to (distributed to) burden centers to establish the responsibility for the costs. Only if the responsibility for cost incurrence is clearly defined can costs be effectively controlled. For example, the costs of maintaining the factory building should first be classified as a building department cost for cost control purposes, and then should be allocated to the various operating departments so that the product being produced may be charged with a pro rata share of the cost of maintaining the building.

Manufacturing overhead is accounted for in numerous ways. The methods of *allocating* the overhead to operating departments and *absorbing* the overhead to product vary from company to company and even within different plants of the same company. The purpose of this chapter is twofold. One is to suggest possible accounting systems for recording manufacturing overhead. The second is to clarify the theory of accounting for overhead by explaining the relation of overhead application to income measurement and determination of financial position.

General Ledger Accounts. Theoretically only one account is needed to record manufacturing overhead in the general ledger. A manufacturing overhead account can be used to record all indirect manufacturing costs. Subsidiary accounts can be used to record detailed information such as the *natural classification* of the cost and the *department where it was incurred.* A refinement of this procedure could be to use two accounts: one to record the manufacturing costs as they are incurred, *manufacturing overhead;* and the second, *manufacturing overhead applied,* to record the application of the costs to product (debit work in process and credit manufacturing overhead applied). This procedure has the advantages of retaining in one account the total manufacturing costs incurred. (If this account was credited to absorb overhead, the account will merely show the unabsorbed balance.) The manufacturing overhead account also acts as a control account over the departmental subsidiary ledgers.



Example

The Manufacturing Company has *incurred* $120,000 of manufacturing costs during the month of January. It has *applied to product* $105,000 of overhead (the $105,000 is determined by the use of predetermined overhead rates). Record this information in the appropriate general ledger accounts.

Misc. Credits	
	(1) $120,000

Manufacturing Overhead Applied	
	(2) $105,000

Manufacturing Overhead	
(1) $120,000	

Work in Process	
(2) $105,000	

Explanation of Entries

(1) Records the incurrence of the overhead costs.

(2) Records the application (absorption) of the overhead to product.

(The $105,000 could have been credited directly to the manufacturing overhead account.)

What is the disposition of the balance of $15,000 (the $120,000 cost incurred, less the $105,000 applied to product)? One possibility is to carry this balance forward from month to month and then close it out to variance accounts at the end of the year. An alternative treatment is to close the "Manufacturing Overhead Incurred and Applied" accounts each month, with the amount necessary to balance the entry being closed to variance accounts (or prorated to inventory and cost of goods sold accounts). In this example this would mean that the $15,000 would be debited to one or more variance accounts. The use and analysis of variance accounts will be explained in detail in Chapter 24.

Is it better to close the overhead accounts or to carry the balances forward to the end of the year? In a company engaged in very seasonal operations, there is much merit in carrying forward the accounts and not attempting to close the balance until the end of the year. In the average situation, despite the presence of a seasonal factor, the choice is not so clear-cut. The choice should remain with the accountant, and he should use the system that presents the best financial and managerial information.

If the balances are carried forward, they will have to appear on the position statement. Where should they appear? The proper location is a subject of controversy. The author suggests that a debit balance be treated as a subtraction from retained earnings (a cost factor of no value, not yet expensed), a credit balance as an addition to retained earnings (the cost of product has been overstated; thus the cost of goods sold has been overstated and income understated). This is not a perfect solution to the dilemma of where to put this item, but it is one possibility.

Subsidiary Records of Manufacturing Overhead. The general ledger accounts used to record manufacturing overhead have been discussed in the preceding section. An accounting system that used only these accounts would have several shortcomings. For one thing the natural classification of the cost has not been recorded. Of what type of costs is the $120,000 of manufacturing overhead composed? Supplies? Depreciation? Indirect labor? Secondly, in what department were the costs incurred? What department head is responsible for the $120,000?

The first of these questions can be answered relatively simply by first recording the manufacturing costs incurred by their natural classification, and then transferring the balances in these accounts to the manufacturing overhead account. But the second question remains unanswered. *What department is responsible for the overhead costs?* The costs as they are incurred should be assigned to departments so that the person responsible for each department can be held accountable for the costs incurred in his department.

One solution is to set up subsidiary records of manufacturing overhead. These records commonly take the form of departmental cost ledgers: for example, one set of accounting cards for each department or a cost distribution sheet for each department. These departmental cost ledgers would record by department the natural classification of each cost incurred. Assume that $1,000 of manufacturing supplies were used as follows:

Building Department	$200
Operating Department No. 1	300
Operating Department No. 2	500

The following entry would be made in the *general ledger:*

Supplies Inventory

√ $50,000	(1) $1,000

Manufacturing Overhead

(1) $1,000	

The same transaction would be recorded in the appropriate *departmental cost ledgers.*

Building Department, Cost Ledger

Indirect Labor		Allocation from Service Dep'ts.		Supplies Used		(Other columns)	
				$200			

Operating Department No. 1, Cost Ledger

Indirect Labor		Allocation from Service Dep'ts.		Supplies Used		(Other columns)	
				$300			

Operating Department No. 2, Cost Ledger

Indirect Labor		Allocation from Service Dep'ts.		Supplies Used		(Other columns)	
				$500			

To be even more useful, the natural classifications may be broken down into even finer divisions. Thus types of supplies may be identified as cleaning supplies, office supplies, first aid supplies, small tools, etc. If this system is used *no entry can be made to the manufacturing overhead account without there being an equal amount recorded in the departmental subsidiary ledgers.* The total debit balance in the manufacturing overhead account will be equal to the total costs recorded in the departmental cost ledgers. Thus the manufacturing overhead account acts as a control account.

Use of Accounting Machines for Recording Manufacturing Overhead. The preceding example was simple and thus easily recorded in the departmental cost ledgers. Imagine a situation where the accounting department is recording information of this nature for 10 plants, each of which has 30 departments and an average of five overhead centers in each department. In this situation costs will have to be coded to 1,500 different burden or cost centers. Each cost will have to be identified as to:

Plant (10 choices)
Department (300 choices)
Overhead Centers (1,500 choices)
General Ledger Account, Manufacturing Overhead
Natural Classification (supply, indirect labor, tax, etc.)
Detailed Description of Natural Classification: Under the classification "Indirect Labor," for example, will be
    Oilers
    Material Handlers
    Sweepers
    Electricians

To record this information inexpensively, yet still keep it readily available, often requires the use of accounting machines. Accounting machines may have the virtue of being cheaper than clerical labor, but this depends on the facts of the particular situation. It can almost always be said in their favor that accounting machines will enable the accountant to record information in more ways than he could if he had to rely on clerical labor. Also the information usually can be obtained more rapidly when needed. This last item is frequently the deciding factor in deciding whether accounting machines of an automatic nature should be employed.

If accounting machines are used, then a system of coding manufacturing overhead will be employed. The exact system will depend on the type of installation, but the system will probably make use of a series of number "groups," each group identifying a bit of relevant information. For example a cost may be coded:

15–14–015–23–45–34

Explanation of Code

First Group:	15	General Ledger Account (Manufacturing Overhead)
Second Group:	14	The code of the plant (the New York plant is No. 14)
Third Group:	015	The department (the packing department)
Fourth Group:	23	The overhead center (this operation weighs the product)
Fifth Group:	45	Natural classification (indirect labor)
Sixth Group:	34	Detailed description (this worker is a weigher)

At the end of the month (in some companies this is done daily or weekly) the machine prints a "run" similar to the following:

PLANT: New York DEPARTMENT: Packing MONTH: January, 1957

Overhead Center	Natural Classification	Code Description	Actual Amount	Budgeted Amount	Variance
23	Indirect Labor	45–34	$435	$420	15
23	Indirect Labor	45–44	520	534	[14] *
23	Supplies	46–23	130	126	4

* The favorable variances are bracketed.

Reports of this nature enable management to determine those specific areas which contain inefficiencies and to take action to rectify the causes of the variances.

Departmental Overhead Rates. The necessity for assigning overhead costs to departments for cost control purposes has already been explained. It is also necessary to assign overhead to appropriate departments so that the cost of product may be computed more exactly. Overhead is generally applied to the product by using overhead rates. Different overhead rates should be computed for each operating department instead of using one overhead rate for the plant.

Why is it important to absorb overhead to product by using different overhead rates for each operating department? The importance can be best shown by a simple illustration.

Example

Two operating departments have the following characteristics:

	Operating Department 1	*Operating Department 2*
Direct-Labor Hours (at normal activity)	10,000	10,000
Machinery and Equipment (cost)	None	$5,000,000
Floor Space	1,000 sq. ft.	29,000 sq. ft.
Power	$100 (lighting only)	$5,000

If only *one* overhead rate is used for the plant, and both departments are worked at normal activity, the product of the two departments will receive the same amount of overhead. With an overhead rate of $4.255 per direct-labor hour this would be $42,550 absorbed by product in each department. Is this reasonable? No, obviously Dept. No. 2 should bear a larger share of the overhead than Dept. No. 1 because it uses more floor space, more equipment, more power, etc. If overhead were first properly *allocated* to departments and separate overhead rates were computed for the two departments, then Dept. No. 2 would have a higher overhead rate, and the product being produced in Dept. No. 2 would then bear a fair share of the overhead costs.

Assume that the following costs are budgeted for the year and are the basis for the one company-wide overhead rate:

Depreciation of Machinery and Equipment	$50,000
Building Costs	30,000
Power Costs	5,100
	$85,100

The overhead rate will be $4.255 per direct-labor hour. Assume that each unit of product produced in Dept. No. 1 and Dept. No. 2 requires one hour of direct labor, and $5.00 of costs other than overhead. According to the figures developed, each unit of product, whether produced in Dept. No. 1 or Dept. No. 2, will cost $9.255 ($5 of direct costs plus $4.255 of overhead). Instead of using one overhead rate, let us now compute departmental rates.

	Allocation of Costs	
	Dept. No. 1	*Dept. No. 2*
Depreciation of Machinery and Equipment	$ ——	$50,000
Building Costs (allocation based on floor space)	1,000	29,000
Power	100	5,000
	$1,100	$84,000
Overhead Rates (based on 10,000 direct-labor hours in each department)	$0.11	$8.40

The cost of the product made in Dept. No. 1 will now be \$5.11 (the direct costs of \$5.00 plus the overhead of \$0.11). The cost of the product made in Dept. No. 2 will be \$13.40 (the direct costs of \$5.00 plus the overhead of \$8.40).

Allocation of Overhead to Operating Departments. Assume that all costs connected with maintaining and running the factory building are first accumulated in a burden center called "Burden, Building." It is next necessary to allocate the accumulation of overhead costs to operating departments. What would be a reasonable basis? Floor space occupied by each operating department (or each burden center) is one likely choice. Cubic volume would also be reasonable.

Note that "burden" is being used interchangeably with "overhead."

Example

The following items have been debited to the account "Burden, Building":

Factory Building	
Depreciation	\$10,000
Repairs	150
Cleaning Supplies	100
Labor	2,750
	\$13,000

There are four operating departments, and they use the following floor space:

Operating Department	
1	3,000 sq. ft.
2	2,000
3	4,000
4	1,000
	10,000 sq. ft.

Compute the allocation of building overhead to the operating departments.

Solution

ALLOCATION OF BUILDING OVERHEAD

Department	Floor Space	Basis of Allocation	Building Costs	Allocation of Building Costs
1	3,000 sq. ft.	30%	\$13,000	\$ 3,900
2	2,000	20	13,000	2,600
3	4,000	40	13,000	5,200
4	1,000	10	13,000	1,300
	10,000 sq. ft.	100%		\$13,000

The journal entry to record the *allocation* would be:

Burden Operating Department		
1	$3,900	
2	2,600	
3	5,200	
4	1,300	
Burden Building		$13,000
To allocate overhead of factory building to operating departments.		

If there is only one burden account in the general ledger, then no formal journal entry is required; the transfer would take place in the subsidiary records.

There are no firm rules for choosing the basis of allocation. The overhead of the service departments is generally allocated on some basis which is reasonable. The following list indicates some of the more likely choices:

Overhead Costs To Be Allocated	*Basis of Allocation*
Power	Rated Horsepower of Equipment
Heat	Cubic Volume of Space Used
Water	Engineering Study of Usage
Repair Shop	Actual Costs Incurred by Each Department
Personnel Department	Number of Personnel
Cafeteria	Number of Personnel
Payroll Department	Number of Personnel
Purchasing Department	Cost of Material Used

Note that an attempt is made to allocate the costs to the departments on the bases of the benefits received by the departments.

A Problem of Re-allocation. A problem arises when the department services another service department and is serviced in turn by that department. The allocation of overhead in this type of situation is best solved by the use of algebra. The solution is relatively simple unless the number of departments involved becomes large.

The *usefulness* of this computation (in effect an allocation and re-allocation) *is limited. It serves no function relative to the control of costs.* It does result in a more logical allocation of costs to the operating departments, and thus leads to a better unit-cost computation. In many cases a reasonable solution can be obtained by using common sense and bypassing the mathematical solution.

Example of Re-allocation Problem

The Building Department should be allocated as follows (percentages are based on use of floor space):

20% to Repair Department
70% to Operating Department No. 1
10% to Operating Department No. 2

The Repair Department should be allocated as follows (percentages are based on this period's repairs):

80% to Building Department
20% to Operating Department No. 1

The costs incurred in the Building Department were $5,960.

The costs incurred in the Repair Department were $2,000.

Compute the total costs of the Building and Repair Departments, and the allocation of these costs to the two operating departments.

Solution

Let B = total building costs (costs incurred directly in the Building Department plus the allocation from the repair shop).
R = total repair costs (costs incurred directly in repair shop plus the allocation from the Building Department).

Then

$$B = 5{,}960 + 0.8R$$
$$R = 2{,}000 + 0.2B$$

The next step is to solve for B and then R.

$$\begin{aligned}
B &= 5{,}960 + 0.8R \\
B &= 5{,}960 + 0.8\,(2{,}000 + 0.2B) \\
B &= 5{,}960 + 1{,}600 + 0.16B \\
0.84B &= 7{,}560 \\
B &= \$9{,}000 \text{ (The "total" Building Department cost.)} \\
R &= 2{,}000 + 0.2B \\
R &= 2{,}000 + 0.2 \times 9{,}000 \\
R &= \$3{,}800 \text{ (The "total" Repair Department cost.)}
\end{aligned}$$

ALLOCATION OF BUILDING AND REPAIR DEPARTMENT COSTS

	Total Cost	Allocated to			
		Op. 1	Op. 2	Building	Repair
Building	$ 9,000	$6,300 (70%)	$900 (10%)		$1,800 (20%)
Repair	3,800	760 (20%)		$3,040 (80%)	
	$12,800	$7,060	$900	$3,040	$1,800

The total of Building Department cost ($9,000) and Repair Department cost ($3,800) is greater than the total cost incurred in the two departments ($7,960).

This occurs because of the re-allocation of building cost to Repair Department, and then repair cost back to Building, etc. The *total overhead allocated to the operating departments* is $7,960, which is equal to the costs incurred in the two service departments ($5,960 plus $2,000).

The journal entries to record the allocation of the Service Department costs will be similar to the following:

Burden—Repair Department	$1,800	
Burden—Operating Dept. No. 1	6,300	
Burden—Operating Dept. No. 2	900	
Burden—Building		$9,000
Burden—Building	3,040	
Burden—Operating Dept. No. 1	760	
Burden—Repair Department		3,800

(These entries will frequently be made only in the subsidiary records.)

Basis for Absorption of Overhead. To this point we have been concerned with the *allocation* of overhead costs to the various operating departments. The next problem is *to absorb* the costs into work in process. This may be accomplished by the use of an overhead rate, the overhead rate being applied to some measure of activity. Among the possible choices for the *measures of activity* are:

Direct Labor, Dollars
Direct Labor, Hours
Units of Product
Hours of Machine Operation
Dollars of Material Used

These items are listed in approximate frequency of use. Any of the above can be acceptable, but the ultimate choice will depend on the facts of the situation. For example, machine hours will not be a good measure of activity where machines play only a small part in the manufacturing process, and the same can be true of direct labor where automation is present. In some cases the information, such as direct-labor hours, is not readily available, and an alternative, such as direct-labor dollars, is used in its stead.

Capacity Considerations. It would be possible to compute the overhead absorbed by product if we were to use an overhead rate based on the actual fixed cost divided by the actual level of activity. Thus, if the overhead were $10,000 (all fixed costs), and there were only one unit produced, the overhead per unit would be $10,000. If instead of producing one unit, there were

1,000 units produced, the overhead per unit would be $10 per unit. This wide change in the overhead per unit is caused by fluctuations in production. To avoid the possibility that unit costs would be affected by changes in production, the accountant hit upon the idea of computing the overhead rate based on capacity operations. If the actual operations were less than capacity, the unabsorbed overhead was considered a cost of idle capacity. Several problems then arose. One was the definition of capacity. Another was the fact that many accountants believed that all the overhead ought to be absorbed by product, not at capacity but at a normal level of operations. Other accountants believed that it should be entirely absorbed at the expected level of operations.

As a result of these complications, many different methods of choosing the level of activity for computing overhead rates are found in practice. Among the most common are:

Practical Capacity
Normal (or Average) Activity
Expected Activity
Actual Activity

There is no general agreement as to which of these methods is best to use. Actual or expected activity is probably the most undesirable, and practical capacity is the procedure with the best theoretical justification. Normal activity is a reasonable compromise.

The term *capacity* brings up some troublesome definitional problems. For example, what is practical capacity: an 8-hour day, 16-hour day, or a 24-hour day? A 320- or a 365-day work year? Is the practical capacity of a football stadium the number of seats times 365 days, or times the number of Saturdays in the playing season? These are the types of problem to which the accountant must come up with reasonable answers for specific situations.

It is important to realize the implications of using the different levels of activity for computing the overhead rates. The balance in the manufacturing overhead account must be interpreted in view of the choice of the level of activity.

Overhead Absorbed. Once the overhead rate has been computed, it is applied to the actual level of activity to find the amount of overhead transferred from the manufacturing overhead account to work in process.

Example

Assume that the following information is available and that overhead is to be absorbed, using direct-labor hours:

	Direct-Labor Hours for January	*Total Budgeted Overhead for January*
Practical Capacity	100,000	$340,000
Normal (or average) Activity	60,000	300,000
Expected Activity	50,000	290,000
Actual Activity	40,000	280,000

Compute the different overhead rates possible from the given information.

Solution: Dividing the second column by the first column:

Practical Capacity	$3.40 per direct-labor hour
Normal (or average) Activity	5.00 per direct-labor hour
Expected Activity	5.80 per direct-labor hour
Actual Activity	7.00 per direct-labor hour

Compute the overhead absorbed by work in process in January if 40,000 direct-labor hours are incurred.

Solution

Using Practical Capacity	$3.40 × 40,000 = $136,000
Using Normal (or average) Activity	5.00 × 40,000 = 200,000
Using Expected Activity	5.80 × 40,000 = 232,000
Using Actual Activity	7.00 × 40,000 = 280,000

The wide differences in overhead cost transferred to work in process will affect the income for the period and the valuation of inventories. This dramatically points up the importance of the choice of activity level for the computation of the overhead rates. The use of any level of operations other than practical capacity will result in a portion of the cost of idle capacity being transferred to product and being lodged in inventory.

Fixed and Variable Overhead Rates. For many business decisions it is necessary to have the total costs separated into the fixed and variable components. Thus the accountant will commonly compute two overhead rates, a fixed overhead rate and a variable overhead rate.

Example

Compute the variable and fixed overhead rates, using a practical capacity of 100,000 direct-labor hours. The fixed costs are $240,000 and the variable costs are $100,000 at the level of activity.

Solution

$$\text{Fixed overhead rate} = \frac{\$240{,}000}{100{,}000} = \$2.40 \text{ per direct-labor hour}$$

$$\text{Variable overhead rate} = \frac{\$100{,}000}{100{,}000} = \$1.00 \text{ per direct-labor hour}$$

$$\text{Total overhead rate} = \underline{\underline{\$3.40}} \text{ per direct-labor hour}$$

If instead of practical capacity the expected activity of 50,000 direct-labor hours were used, the two overhead rates would be:

$$\begin{aligned}
\text{Fixed overhead rate} &= \frac{\$240{,}000}{50{,}000} = \$4.80 \text{ per direct-labor hour}\\
\text{Variable overhead rate} &= \frac{\$50{,}000}{50{,}000} = \$1.00 \text{ per direct-labor hour}\\
\text{Total overhead rate} &= \qquad\qquad \underline{\underline{\$5.80}} \text{ per direct-labor hour}
\end{aligned}$$

The *variable overhead rate is unchanged,* but the *fixed overhead rate has changed radically.* The choice of the activity level will always affect the fixed overhead rate (and by affecting the fixed overhead rate, it will affect the total overhead rate). The absorption of fixed overhead costs is a troublesome item since it is so dependent on the choice of the activity level at which the fixed overhead rate is computed. For certain purposes better information is obtained if fixed costs are not absorbed by product but are treated as period costs. This possibility is covered more completely in Chapter 28, Variable Costing.

Summary of Manufacturing Overhead. The reader should keep in mind the objectives connected with the accounting for manufacturing overhead. The accountant wants to:

1. Control costs
2. Determine costs of product for purposes of measuring income, determining financial position, and decision-making.

These objectives are not always compatible, and the accountant may have to make special computations to accomplish the specific objectives at hand.

The control of costs is facilitated by the recording of overhead costs by cost centers, and by identifying the costs in as much detail as is possible. Periodically the actual costs are compared with the budgeted costs to determine whether the specified level of efficiency has been attained.

The cost of products is determined by the use of predetermined overhead costing rates. These costing rates should be broken up into their fixed and variable components so that costs for different purposes may be computed. The costing rates should be computed, not for the company or plant as a whole but for each operating department (or cost center). The use of departmental overhead rates will give more realistic unit-cost figures, since the cost of the product will include those costs which are identified with the product, either through direct identification or through reasoned bases for the allocation of indirect costs not directly identified with an operating department.

Since the cost of product as computed by a cost accounting system is greatly affected by the method used to absorb fixed costs to product, the unit cost of a product should never be accepted at its face amount but only after due consideration is paid to the method used to absorb fixed overhead cost.

It should be noted that the allocation of overhead to operating departments and the absorption of overhead by product are not useful for the control of costs. Costs should be controlled at the point of incurrence by the person who is responsible for the area where they are incurred. For example, accounting costs are controlled by the controller, not by the operating department foreman who may have some of the accounting department costs allocated to his department.

Why then should costs of an indirect nature be allocated to operating departments and absorbed by product? There are several valid purposes:

1. Determining income of a product or division, department, etc.
2. Determining cost of the goods remaining in inventory.
3. Determining cost for government "cost-plus" contracts.
4. Determining cost of product sold to see how well unit price recovers total unit cost.

Knowing how the allocations of overhead costs *cannot* be used is just as important as knowing how they *can* be used. There is a great deal of effort wasted in trying to use overhead allocations for purposes for which they cannot be used.

QUESTIONS AND PROBLEMS

22–1. The Absorption Corporation is in the process of changing its cost accounting system. It has decided on the use of direct-labor dollars as the basis for absorbing overhead into work in process.

Required

(a) Given the following information, compute the different variable and fixed overhead rates which might be used.

BUDGET INFORMATION FOR 1958

	Budgeted Direct-Labor Dollars	Budgeted Fixed Overhead	Budgeted Variable Overhead
Practical Capacity . . .	$200,000	$450,000	$400,000
Normal (average) Activity	90,000	450,000	180,000
Expected Activity . . .	100,000	450,000	200,000

(b) Compute the overhead absorbed by product in January, 1958, if $10,000 direct-labor dollars of cost were incurred. Fixed overhead incurred was $38,000 and variable overhead was $22,000. Give four different answers based on four different assumptions. State the assumptions made.

(c) Explain the difficulties connected with determining the "actual" cost of product.

(d) In this problem, overhead is absorbed, using direct-labor dollars. What other measures of activity could be used?

22–2. The Allocation Company

Part I. The Allocation Corporation has two operating departments and three service departments. The costs of the service departments are assumed to be *fixed.*

Service Department	Basis of Allocation	Budgeted Cost for 1958
Cafeteria	Personnel Budgeted	$ 45,000
Building	Floor Space	120,000
Repair Shop	Past Experience (the previous year's assignment of costs)	31,200

Operating Department	Personnel Budgeted	Floor Space (Sq. Ft.)	Repair Shop Jobs, 1957
1	50	4,000	$10,000
2	100	6,000	20,000

In addition to the above indirect costs, the only other overhead costs are manufacturing supplies and indirect labor. These are budgeted for 1958 as follows:

		A Year's Budgeted Costs for Normal Activity			
Operating Department	A Year's Normal Activity (Direct-Labor Hr.)	Manufacturing Supplies, Fixed	Manufacturing Supplies, Variable	Indirect Labor, Variable	Indirect Labor, Fixed
1	100,000	$ 9,000	$20,000	$75,000	$50,000
2	200,000	15,000	30,000	80,000	60,000

Required

(a) Prepare a schedule that allocates the service department budgeted costs to the operating departments.

(b) Compute one overhead rate for the Allocation Company as a whole.

(c) Compute separate overhead rates for the two operating departments.

(d) Comment briefly on the relative usefulness of the various overhead rates computed above.

Part II. During the month of January, 1958, the following costs were incurred:

	Cafeteria Dept.	Building Dept.	Repair Shop	Operating Dept. No. 1	Operating Dept. No. 2
Direct Labor (the hourly rate is $2.00)				$20,000	$32,000
Direct Material				40,000	70,000
Indirect Labor	$2,000	$1,000	$3,000	14,000	15,000
Manufacturing Supplies	200	100	1,000	1,500	1,900
Fuel + Power	600	1,200		1,000	4,000

Required

(a) Record the incurrence of the costs in the appropriate cost (burden) centers. (Use both factory ledger and departmental subsidiary records.)

(b) Record the allocation of the Service Department costs to the operating departments (also prepare a schedule of the allocation).

(c) Record the debits made to the work in process account during the month. Show the entries in the "T" accounts. Use the overhead rates computed in Part I(c).

(d) From the point of view of controlling costs, is the allocation of costs (b) and (c) useful?

22–3. The Re-allocation Corporation has two operating departments and two service departments.

The Building Department should be allocated as follows:
10% to Utility Department
45% to Operating Department No. 1
45% to Operating Department No. 2

The Utility Department should be allocated as follows:
50% to Building
40% to Operating Department No. 1
10% to Operating Department No. 2

The costs incurred in the Building Department were $90,000; in the Utility Department, $10,000.

Required

(a) Compute the allocation of the service departments and prepare journal entries to accomplish the allocation to the operating departments.

(b) Discuss the usefulness of the allocation from the point of view of controlling costs and determining unit costs of product.

22–4. The Williams Manufacturing Company's production activities involve three producing departments and a factory office. All materials are added at the start of process 1. Processed material moves from process 1 through process 2, then through process 3, where the product is completed.

The following account balances reflect costs of the Williams Company for the month of January 1958.

Materials Used	$ 8,200
Direct Labor	11,600
Indirect Labor	1,700
Sales Salaries	4,200
Taxes, Properties	2,100
Depreciation of Factory Building	714
Depreciation of Equipment	550
Advertising	1,455
Factory Office Labor	900

Direct-labor costs were as follows:

Process 1	$ 4,900
Process 2	2,700
Process 3	4,000

Indirect labor is primarily janitorial in nature, and distribution is made to the three producing departments and the factory office, giving double weight to the producing department. Floor space is as follows:

Process 1	2,500 sq. ft.
Process 2	3,500
Process 3	2,000
Factory Office	1,000

Property tax valuations are as follows:

Process 1	$13,000
Process 2	16,000
Process 3	10,000
Factory Office	3,000

Depreciation is charged at a uniform rate on all equipment. The cost of equipment in each department is as follows:

Process 1	$ 7,500
Process 2	5,500
Process 3	13,000
Factory Office	1,500

Since the factory office is maintained primarily for timekeeping and employee services, the cost of operating the office is distributed to the producing departments on the basis of the number of workers in each department. They are as follows:

Process 1	10 workers
Process 2	4
Process 3	6
Factory Office	2

Required: Prepare a schedule allocating production costs to the three producing departments. Set up overhead accounts for each of the four departments. Make entries to these accounts, showing the results of the allocation.

22–5. The Webster Corporation

The Webster Corporation uses normal activity for determining overhead rates. Overhead is applied to product, using direct-labor hours.

Part I. Determining Overhead Rates:

	Dept. No. 1 Normal Activity	*Dept. No. 2 Normal Activity*
Budgeted Direct-Labor Dollars	$200,000	$400,000
Budgeted Direct-Labor Hours	100,000	200,000
Budgeted Fixed Overhead	50,000	40,000
Budgeted Variable Overhead	150,000	180,000

Required

(a) Compute the fixed and variable overhead rates for the two departments.

(b) Explain briefly how the amounts of fixed overhead were obtained for the two departments.

(c) Explain how the above computations would be changed by the use of practical capacity instead of normal activity.

Part II. Recording Overhead in Burden Centers:

During the month of January the following overhead costs were incurred:

	Building Dept.	*Dept. No. 1*	*Dept. No. 2*
Indirect Labor (fixed)	$200	$ 4,000	$ 2,000
Indirect Supplies (fixed)	100	1,000	1,200
Indirect Labor (variable)	...	10,000	11,000
Indirect Supplies (variable) ...	...	2,000	3,000

Required

(a) Record the given information in general ledger accounts.

(b) Record the given information in departmental subsidiary ledgers.

(c) If the direct-labor hours actually worked during the month were 9,000 in Department No. 1 and 18,500 in Department No. 2, are the variable overhead costs under or over the budgeted amounts? Prepare a schedule.

Part III. Allocation of Overhead to Operating Departments:

The Building Department costs are allocated to the two operating departments, based on the floor space used.

Department	*Floor Space Used, Sq. Ft.*
1	30,000
2	10,000

Required

(a) Record the allocation of the Building Department overhead to the two operating departments in the departmental subsidiary ledgers.

(b) Would the allocation of Building Department costs be relevant for controlling the costs of the Building Department or the operating departments? Explain.

Part IV. Absorption of Overhead by Product:

During the month of January there were 9,000 direct-labor hours worked in Department No. 1 and 18,500 worked in Department No. 2.

Required

(a) Record the absorption of overhead by product in the general ledger.

(b) What are the factors that caused the amount of overhead absorbed by product to be different from the amount incurred?

(c) What disposition do you suggest for the overhead variances?

23

Systems of Cost Accounting

COST ACCOUNTING SYSTEMS may be classified under three general headings:

Job Order Cost Accounting
Process Cost Accounting (either by process and/or by product)
Standard Cost System (used most commonly with the process cost system)

The reader should not be deluded into thinking that the accountant is limited to only three systems. There are many variations and combinations which he may use. The ultimate choice of systems will depend on the facts of the situation and the needs of management.

Job Order Cost System. Costs are best accumulated by jobs when the firm is engaged in a nonrepetitive type of productive process and where each product or group of products is more or less distinctive.

Each job is given a job number or code. When material or labor costs connected with the job are incurred, they are recorded in the general ledger in the work-in-process account, and in a subsidiary ledger which maintains the cost of each job. This subsidiary ledger often takes the form of a card called a job cost sheet.

Illustration of Job Cost Sheet (subsidiary ledger)

Job Number ____________

Description ____

Date ____________________ Date To Be Completed ____________________

Specifications ____________ Bill of Materials ____________________

			Direct Labor		
	Date	Direct Material	Hours	Dollars	Overhead
Completed					
Job					

For every cost recorded in the work-in-process account of the general ledger, an equal entry is made on a job cost sheet. Thus the *work in process* account acts as a *control* over the subsidiary record, the *job cost sheets,* and the sum of the costs recorded on the individual job cost sheets should be equal to the balance in the work-in-process account.

Illustration: The following is an illustration of the job cost procedure. Three entries will be recorded in the general ledger and in the subsidiary record.

Entry No.	Transaction	Source of Entry
1	Material placed into production	Summary of material requisitions
2	Direct-labor cost incurred	Labor distribution sheet of timekeeper
3	Overhead applied to product	The overhead rate is $1.60 per direct-labor hour

SUMMARY OF MATERIAL REQUISITIONS

Date	Req'n. No.	Job No.	Amount, Lb.	Amount, $	Type of Material
Jan. 21	26	556	60	$ 600	Plastic Powder
21	27	557	40	400	Plastic Powder
			100	$1,000	

DIRECT-LABOR DISTRIBUTION

Date	Job No.	Hours	Wages	Overhead Rate	Overhead Applied (DLH × $1.60)
Jan. 21	556	700	$1,400	$1.60	$1,120
21	557	300	600	1.60	480
		1,000	$2,000		$1,600

General Ledger

Material Inventory

xxxxx	(1) $1,000

Manufacturing Overhead

xxxxx	(3) $1,600

(The credit could be made to "Manufacturing Overhead, Applied")

Payroll

	(2) $2,000

Work in Process

(1) $1,000	
(2) 2,000	
(3) 1,600	

Subsidiary Record (Job Cost Sheets)

JOB COST SHEET
JOB NO. 556

Date	Material			Labor		Overhead	
	Req'n. No.	Amount, Lb.	Amount, $	Hours	Dollars	Rate	Dollars
1/21	26	60	$600	700	$1,400	$1.60	$1,120

JOB COST SHEET
JOB NO. 557

Date	Material			Labor		Overhead	
	Req'n. No.	Amount, Lb.	Amount, $	Hours	Dollars	Rate	Dollars
1/21	27	40	$400	300	$600	$1.60	$480

The total costs recorded on the job cost sheets equal the total costs recorded in the work-in-process account.

Work in Process

Material	$1,000
Direct Labor	2,000
Overhead	1,600
Balance	$4,600

JOB COST SHEETS

Job	Material	Labor	Overhead	Total Costs
556	$ 600	$1,400	$1,120	$3,120
557	400	600	480	1,480
Totals	$1,000	$2,000	$1,600	$4,600

When the job is completed, the job cost sheet is taken from the work-in-process file and is placed in the finished goods file. The completed cost card serves as the subsidiary ledger for the finished goods account. A journal entry is then made, transferring the total cost of the job from work in process to finished goods.

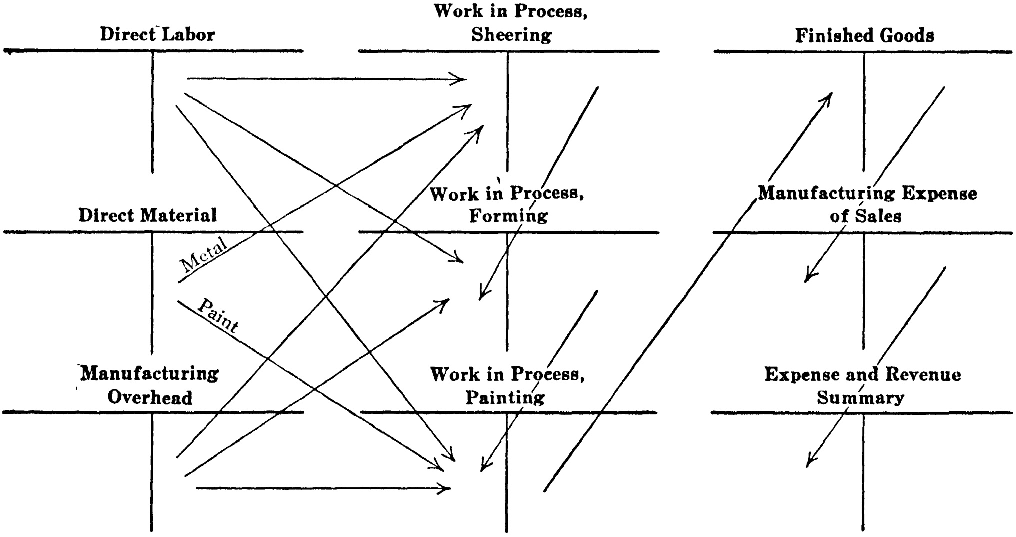
There is a column on the cost card for overhead. If the job is completed during the accounting period, the overhead can be computed for the entire job rather than on a daily basis as the labor cost is incurred. If the period ends before the job is completed, the overhead should then be computed.

The total of the overhead is the basis for the entry transferring overhead from the manufacturing overhead account to the work-in-process account.

The job order cost system is fairly expensive to maintain because it requires considerable clerical work to record the detailed information on the job cost sheets. The process type of cost system should be used if possible, but it should be recognized that the job cost system fills a need in those situations where the manufacturing operation is not repetitive.

Process Cost System. The process cost system makes no attempt to account for costs of individual items or specific groups of items. Instead, all costs are placed into "reservoirs" and allocated out to product on a systematic basis. The costs may be accumulated for different processes in the production of one product, or it may be necessary to have different series of "reservoirs" for different products. The "reservoir" or places to accumulate costs are actually work-in-process accounts, there being different process accounts for every major manufacturing process for each product.

Let us assume a manufacturing process of three steps in which only one product is made. Metal is first sheared, then formed, and then painted. This requires three work-in-process accounts, and the costs will flow as indicated in the accompanying flow chart (in the chart paint is considered a direct material; it could be treated as overhead).


Direct Labor
Work in Process, Sheering
Finished Goods
Direct Material
Metal
Paint
Work in Process, Forming
Manufacturing Expense of Sales
Manufacturing Overhead
Work in Process, Painting
Expense and Revenue Summary

Only one overhead account is shown in the flow chart. In many cases it is desirable to set up different overhead accounts for each process. These overhead accounts are sometimes referred to as "burden centers." The more overhead accounts, the more accurate the cost accounting tends to be, but the costs of recording the information are increased.

If an additional product is being produced which also requires three processes, there are three additional work-in-process accounts, an additional finished goods account, and one or more additional overhead accounts. If the amount of work required for the two products were exactly the same, and the only difference were in the characteristics of the end product, then no additional accounts except an additional finished goods account would have to be opened.

Instead of having *one* work in process account for the shearing process, it is also possible to have *three* in process accounts, one each for material, labor, and overhead. This is useful in practice.

Problems Peculiar to Process Cost Accounting. So far it has been assumed that the amount of cost to be transferred from process 1 to process 2 has been known. Actually, this type of transfer requires computations that, though simple in principle, become complicated in practice if the manufacturing process (and the cost accounting system) is complicated. The procedure to be followed in computing the transfer to the next process and the amount remaining is best illustrated by a short example.

Example

Compute the transfer of labor in process to finished goods, given the following facts:

Beginning Inventory	100 units (¼ completed)
Ending Inventory	200 units (½ completed)
Completed during the Period	500 units
Labor Costs Incurred during the Period	$1,150
Labor in Process at the Beginning of the Period	$75

Solution: The *first step* in the solution is to compute the *"equivalent" units of work performed.*

Total Units Finished	500
Plus Ending Inventory (200 × ½)	100
	600
Less Beginning Inventory (100 × ¼)	25
Total Equivalent Units of Labor during the Period	575

The same solution may be obtained by using a slightly different technique.

Units of Labor Required to *Complete* the Beginning Inventory (100 × ¾)	75
Units of Labor Required to *Start and Complete* 400 units	400
Units of Labor Required to *Start* the Ending Inventory (200 × ½)	100
Total Equivalent Units of Labor Performed during the Period	575

The *second step* in the solution is to compute the *cost per unit of work performed during the period.*

$$\text{Cost per equivalent unit of labor} = \frac{\text{direct-labor costs incurred}}{\text{equivalent units of labor}} = \frac{\$1{,}150}{575} = \$2 \text{ per unit of labor}$$

The *third step* is to assume *a flow of costs* (FIFO, LIFO, or average). This is necessary because the cost per unit of the opening inventory will rarely agree with the cost per unit incurred during the period. In the problem being illustrated, the cost per unit of the opening inventory is

$$\frac{\$75}{100 \times 0.25} = \frac{\$75}{25} = \$3 \text{ per unit}$$

If a *FIFO* assumption as to the flow of costs is assumed, then the transfer to finished goods can be computed as follows:

Opening Inventory (100 × ¼ × $3)	$ 75
Required to Complete the Opening Inventory (100 × ¾ × $2)	150
Required to Start and Complete 400 units (400 × 1 × $2)	800
Transfer to Finished Goods	$1,025

The *fourth step* is to compute *the amount remaining in work in process.* This may be done in either of two ways.

Beginning Inventory, Labor in Process	$ 75
Labor Costs Incurred during the Period	1,150
	$1,225
Less Amount Transferred to Finished Goods	1,025
Amount Remaining in Process	$ 200

The $200 can also be computed (or checked) by multiplying the equivalent units of labor in the ending inventory by the labor cost per unit of labor. This can be done *if* all the ending inventory was constructed during this period.

200 units × ½ × $2 = $200 (Labor in Process, Ending Inventory)

The *fifth step* is to prove the solution. This consists of adding the amount transferred to finished goods ($1,025) and the ending inventory ($200), and checking the sum ($1,225) to see that it equals the sum of the costs incurred ($1,150) and the beginning inventory ($75).

Summary: The solution consists of five steps:

1. Determine the number of equivalent units of labor performed.
2. Determine the cost per unit of work performed.
3. Assume a flow of costs and compute the transfer to finished goods.
4. Compute the ending work in process inventory.
5. Prove the solution.

If a LIFO assumption was made as to the flow of costs, the transfer to finished goods will be:

500 units × \$2 = \$1,000 (Transfer of Labor Costs to Finished Goods)

The ending inventory of labor in process would be \$225.

25 equivalent units of labor valued at \$3 =	\$ 75
75 equivalent units of labor valued at \$2 =	150
100 equivalent units valued as indicated =	\$225

The computations can be checked by adding the \$1,000 and \$225 and comparing this with the sum of the opening inventory and the labor cost incurred during the period (\$1,225).

Instead of FIFO or LIFO, an *average* costing procedure can be used. To value the transfer to finished goods, the same average cost per unit will be used as is used to value the amount remaining in the work in process; thus the opening inventory is used in computing the average cost per unit.

$$\text{Average cost per unit} = \frac{\$75 + \$1{,}150}{25 + 575} = \frac{1{,}225}{600} = \$2.04167$$

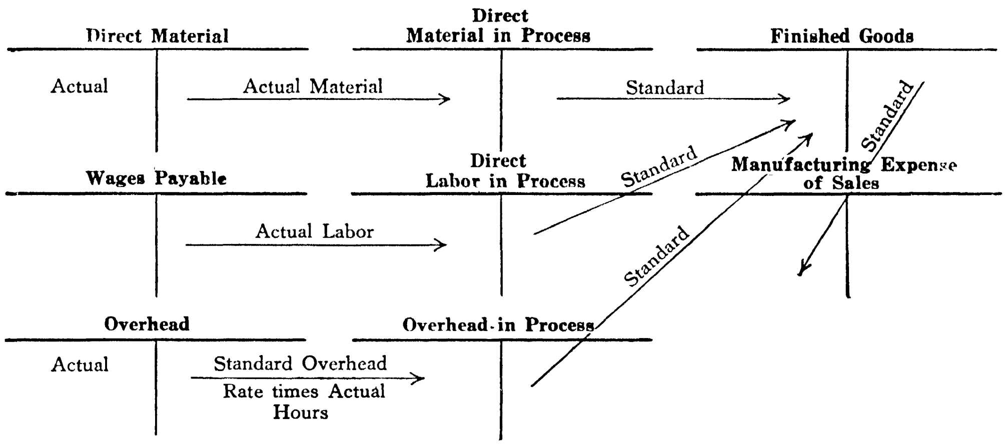
Transfer to finished goods (500 × \$2.04167) =	\$1,020.83
Amount remaining in process (200 × ½ × \$2.04167) =	204.17
	\$1,225.00

There are various complications that may be introduced. Some of the material may be added when the product is partially completed, or it may all be introduced at the beginning of the process. Part of the material may "evaporate," resulting in a complication, especially when the disappearance of material is in excess of normal. Normal spoilage or loss is spread over the good product, but abnormal spoilage is considered a loss. There are techniques for solving all these problems, and they soon get to be second nature to the practicing accountant. The various complications will not be illustrated here because they are specialized problems which are better treated in a more advanced course.

Standard Cost System. Standard cost systems are usually process cost systems in which accountants use set standards instead of attempting to compute a so-called actual cost per unit for each period. There are several advantages of a standard cost system. It may actually be cheaper to operate than a process or job order system (usually a standard cost system is not generally applicable to a situation where a job order system is being used, although there may be exceptions). The advantages of a standard cost system are that it highlights inefficiencies and allows management to manage by exception, i.e., concentrate on the areas where there are inefficiencies.

The actual labor and the actual material incurred are debited to the work-in-process accounts.[1] The *standard labor* and *standard material* are transferred to the finished goods account. What happens to any differences between the actual costs incurred and the standard costs? These differences are called *variances*. They are identified according to their causes and are transferred to variance accounts. For material and labor the two variance accounts are price and efficiency variances. These will be explained in detail in Chapter 24.

Overhead is treated in a variety of ways. The following system is suggested as one of many logical procedures. The *standard* overhead rate is applied to the *actual* direct-labor hours incurred to find the amount of the manufacturing overhead incurred, which is transferred to the work-in-process account. The amount of overhead transferred from the work-in-process account to finished goods is found by multiplying the *standard* hours per units of product by the *standard* overhead rate. Thus part of the variances for overhead will be found in the work-in-process account and part in the manufacturing overhead incurred account. The nature and disposition of the variances will also be discussed in Chapter 24.


Direct Material
Actual
Actual Material
Direct Material in Process
Standard
Finished Goods
Standard
Wages Payable
Actual Labor
Direct Labor in Process
Standard
Manufacturing Expense of Sales
Standard
Overhead
Actual
Standard Overhead Rate times Actual Hours
Overhead in Process

Factory Ledger. Frequently the amount of accounting necessary to record the factory operations becomes so great that a separate accounting section is set up to perform this function. In some cases the location of the factory accounting department is geographically distant from the general accounting department. In order to maintain control and to help ensure that neither the general accounting nor the factory accounting department misses entries or makes incorrect entries, use is made of two control accounts, a factory ledger account and a general ledger account.

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[1] In many cases it will be possible to record material into inventory by using standard prices and by taking the material to work in process at standard prices instead of actual prices. There is much to be said for this procedure, since it recognizes the price variance in the period in which the material is purchased, and it should be used whenever possible.

The general accounting department will maintain the general ledger, in which there will be a "Factory Ledger" account. The factory accounting department will maintain the factory ledger, in which there will be a "General Ledger" account. The balances of these accounts will always be equal when they are fully and correctly posted. Just what other accounts will be kept at the factory or at the general accounting office will vary considerably from company to company. The main differences are in the area of fixed assets, material inventory, and finished goods. If the last two items are physically controlled by the plant, then the plant should also account for them.

When a company has several branch offices, a necessity arises for the same type of accounting system as is being introduced here. The only differences are in the titles of the control accounts. These titles may be "Home Office" (in the accounting records maintained by the branch office), and "Branch Office" (in the accounting records maintained by the central or home office).

Illustration of the Use of a Factory Ledger (Branch Accounting)

The following four entries are to be recorded in the factory ledger and the general ledger.

1. Purchase of $1,000 of raw material.
2. The factory places into production $800 of the raw material.
3. Direct-labor costs of $2,000 are incurred.
4. Finished goods of $1,500 are shipped to the storehouse.

General Ledger

Accounts Payable

		(1)	$1,000

Factory Ledger Account

(1)	$1,000	(4)	$1,500
(3)	2,000		

Payroll

		(3)	$2,000

Inventory, Storehouse

(4)	$1,500		

Note: Entry (2) requires no entry in the general ledger. The debits in the factory ledger account are in a sense recording "receivables" from the factory.

Factory Ledger

Material Inventory

(1)	$1,000	(2)	$800

General Ledger Account

(4)	$1,500	(1)	$1,000
		(3)	2,000

Work in Process

(2)	$ 800	(4)	$1,500
(3)	2,000		

Note: The balance in the factory ledger account is equal to the balance in the general ledger account (although one has a debit and the other a credit balance).

The credits in the general ledger account are in a sense recording "payables" to the central office. The amount payable is reduced by the transfer of goods to the central office, to warehouses under control of the central office, or to customers.

QUESTIONS AND PROBLEMS

23–1. The Matson Mfg. Co. specializes in producing machine tools according to specifications provided by its customers. It uses the job cost system of accounting.

Required: Enter the following information directly into the accounts in the factory ledger. Make all necessary entries on job cost sheets. All accounts not in the factory ledger are in the general ledger, which is kept by someone else. Key each item in the accounts.

(a)	Materials inventory, Oct. 1	$16,500
(b)	Supplies inventory, Oct. 1	$ 3,150

(c) Unfinished cost sheets, Oct. 1 as follows:

Job No.	*Materials*	*Direct Labor*		*Burden*
1115	$1,325	400 hr.	$ 800	$ 640
1118	810	250 hr.	500	400
1120	765	300 hr.	475	480
	$2,900		$1,775	$1,520

(d) Materials used during October were as follows:

Req'n. No.	*Job No.*	*Cost*
56	1118	$ 515
57	1120	665
58	1121	910
59	1124	720
		$2,810

(e) The balance in the burden account on Oct. 1 was $60 (Dr).
(f) Material purchases during October amounted to $3,890.
(g) A summary of labor costs is as follows (ignore taxes):

Job No.	*No. of Hr.*	*Cost*
1115	50	$ 95
1118	120	215
1120	85	160
1121	65	120
1124	30	65
Total Direct Labor	350	$655
Indirect Labor	72	115
	422	$770

(h) Supplies purchased during October were $440.

(i) Supplies consumed during October were $545.

(j) Miscellaneous other burden charges for October were $105.

(k) The burden rate is the same as in previous periods (based on direct-labor hours).

(l) The following jobs were completed in October and delivered to the customers: Jobs 115, 118, and 1120.

(m) The accounts in the factory ledger are:
Materials, Inventory
Supplies, Inventory
Burden
Material in Process
Labor in Process
Burden in Process
General Ledger

The form to use for the cost sheets is as follows:

COST SHEET

JOB NO. ________

Material		Direct Labor		Burden	
Requisition Number	Cost	Hours	Cost	Rate	Cost

23–2. The Labor-in-Process Company

(a) Compute the equivalent units of labor performed on the following products.

Product	Beginning Inventory in Process	Completed Production	Ending Inventory in Process
1	100 units (¼ completed)	200	None
2	———	200	100 units (¼ completed)
3	100 units (¼ completed)	200	100 units (½ completed)
4	100 units (½ completed)	200	100 units (¼ completed)

(b) If the labor cost incurred in making Product 2 during the period was $10,000, compute the amount of labor in the ending inventory of labor in process for Product 2.

(c) If the labor cost incurred during the period in manufacturing Product 3 was $20,000, compute the amount of labor in the ending inventory of labor in process of Product 3. The beginning inventory of labor in process was $2,600. Assume a FIFO flow of costs.

23–3. The Allison Manufacturing Company produces a single product. Raw Material A is committed to the production process at the start of Process 1. Operating data for the period just ended are as follows:

	Process 1		Process 2	
Beginning Inventories	270 lb. (⅓ finished)	$1,152	160 lb. (½ finished)	$1,972
Raw Material A Used	650 lb.	1,170		
Direct Labor and Burden		5,616		3,774
Ending Inventories	200 lb. (¾ finished)		90 lb. (⅓ finished)	

The weight of the finished product is exactly equal to the weight of the material used.

Required

(a) How many pounds of product were transferred from Process 1 to Process 2 during the period? How many equivalent units of labor were performed in Procss 1? What is the cost per equivalent unit of labor and burden in Process 1 for the period?

(b) Set up "T" accounts for Process 1, Process 2, and finished goods, and enter therein the operating results for the period. Assume a FIFO flow.

(c) What was the labor and burden cost per pound of product (cost per equivalent unit) in Process 2 for this period?

(d) How do labor costs for the period just ended compare with those of the preceding period for Process 1? Assume that material costs were the same in each period and that a constant overhead rate is used throughout the year.

23–4. The following information applies to the only product produced by the May Company:

Work in process, January 31 inventory, 900 units, ⅓ completed.
Work in process, January 1 inventory, 800 units, ½ completed.
Product finished during January, 1,000 units.

Direct Labor Cost for January		$2,205
Material Used during January		$3,850
Direct Labor in Process, January 1	$ 800	
Material in Process, January 1	$3,200	
Overhead in Process, January 1	$1,600	

The material is introduced in the beginning of the production process. The labor is applied evenly throughout the production process. The overhead rate is $2 per direct-labor dollar.

Required

(a) The equivalent units of labor performed during January.
(b) Units of product started during January.
(c) Average cost of equivalent unit of product started and produced during January.

The following two problems assume a FIFO flow of costs:

(d) The cost of goods finished during January.
(e) The cost of the January 31 inventory is:
________ direct labor in process, January 31
________ material in process, January 31
________ overhead in process, January 31

23–5. The Firehouse Company

The Firehouse Company uses a LIFO procedure for inventory. The company does not use a finished goods account but transfers the cost of product sold directly from work in process to the "Cost of Goods Sold" account.

The following information applies to the month of July:

July 1, Inventory of Labor in Process, 1,000 equivalent units which cost $2,000.
Production for July was 100 equivalent units. The direct-labor cost for the month was $300.
During the month 900 units were shipped.

The amount of labor cost to be transferred to cost of goods sold was computed as follows:

$$\text{Labor costing rate} = \frac{\text{direct labor cost for July}}{\text{equivalent units produced}} = \frac{\$300}{100} = \$3 \text{ per unit}$$

$$\begin{aligned}\text{Transfer to cost of goods sold} &= \text{units shipped} \times \text{labor costing rate}\\ &= 900 \times \$3 = \$2{,}700\end{aligned}$$

Required: Comment on the procedure followed.

23–6. The Waterhouse Company

The plant manager of the Waterhouse Company is confused by the accounting reports of income which have been coming across his desk. It appears recently that the more inefficient the workers are (according to the production reports), the higher the profit reported by the accounting department. Since this does not appear to be reasonable he has called in an expert (you).

The Waterhouse Company manufactures dashboard assemblies for a large automobile producer. Beginning in July the company starts building up an inventory so that when the new model year starts in October it can supply a steady stream of product without resorting to an excessive amount of overtime.

The company has adopted a process cost accounting system, using actual costs. Since the stock is handled so that the oldest goods are shipped first, an FIFO assumption as to the flow of costs is followed. As is common with many manufacturers, the Waterhouse Company keeps all product in the work-in-process account until it is shipped and does not use a finished goods account (work in process is credited and manufacturing cost of goods sold is debited when goods are shipped).

The following information is made available to you for the month of September (all the information refers to direct labor in process):

Beginning Work in Process Inventory (Sept. 1)		$2,520
Units of Goods Completed	850	
Units of Goods One-half Completed	100	
Units Shipped during the Month	100	
Ending Work in Process Inventory:		
Units of Goods Completed	975	
Units of Goods One-half Completed	50	
Direct-Labor Costs for the Month	$600	
Equivalent Units of Production during September	200	

The amount transferred to cost of goods sold was computed by the following procedure:

Ending Inventory, Equivalent Units:	
Goods Completed	975
Goods in Process (50 × ½)	25
Total Equivalent Units in Inventory	1,000
Cost per Unit Produced during the Period ($600 ÷ 200)	$3.00
Cost of Ending Inventory (assuming that the most recently produced goods are still in inventory) 1,000 × $3.00	$3,000
Computation of Transfer to Cost of Goods Sold:	

Work in Process, Beginning of Period	$2,520
Plus Costs Incurred	600
	$3,120
Less Ending Inventory	3,000
Amount To Be Transferred to Cost of Goods Sold	$ 120

Required

(a) Why does the above procedure give misleading information?

(b) If the direct-labor costs for the month had been $800 (assuming the same production), what would have been the transfer to cost of goods sold?

(c) Compute the transfer to cost of goods sold, following a reasonably correct FIFO procedure.

23–7. The Stan-low Corporation

Part I. The Stan-low Corporation makes two products, A and B. The company uses two work-in-process accounts, one for product A and the other for product B.

The following standard costs have been established and are used in the cost accounting system:

	Product A	*Product B*
Material		
Standard Cost of Wood	$0.20	$0.30
Standard Cost of Paint	—	0.02
Labor		
Cutters (standard cost per unit)	0.40	0.60
Finishers (standard cost per unit)	0.25	0.30
Overhead Rates		
Variable (varnish, power, glue, etc.)	0.25 *	0.50 *
Fixed (foreman, depreciation, etc.)	0.75 *	1.00 *

* Per direct-labor dollar. Cutters earn $2.00 per hour; finishers, $2.50 per hour.

Required

(a) Compute the standard cost per unit for each product.

(b) If the total fixed costs budgeted for the year were $30,000 and if $7,500 of these costs were allocated or identified with *product A*, what amount of direct-labor dollars was used in computing the fixed overhead rate? What was the fixed overhead rate if the level of activity used to compute the rate was 200,000 units of product A?

Part II. The following information relates to the month of May for Product B:

Cost of Wood Used	$310
Cost of Paint Used	$21
Direct Labor, Cutters	$620
Direct Labor, Finishers	$290

Overhead Incurred	
Variable	$450
Fixed	$1,000
Units Finished during May	950
Units in Process May 31	
(Units assumed to be one-half completed, labor and paint; all completed, wood)	250
Units in Process May 1	
(Units assumed to be one-half completed, labor and paint; all completed, wood)	150

The work in process at the beginning of May was valued at standard cost.

Required: Set up a work-in-process account for Product B. Record the beginning work in process, the costs incurred, the transfer to finished goods, and the closing of the variances to an account called "Variances from Standard Costs." Overhead is to be absorbed to product, using direct-labor dollars.

23–8. The Newcastle Corporation

The Newcastle Corporation makes one model of one product. The following information is available for the month of April:

	Actual Costs Incurred	In Process Inventory, the Beginning of the Period at Standard Cost	Goods Finished during April at Standard Cost	Goods in Process, End of Period at Standard Cost
Direct Material (Requisitioned)	$ 43,400	$12,000	$ 40,000	$13,000
Direct Labor	84,300	20,000	80,000	20,400
Fixed Overhead	21,000	5,000	20,000	5,100
Variable Overhead	163,000	40,000	160,000	40,800

There were $7,500 of finished goods (500 units) in inventory at the beginning of the period. During the month of April, 20,000 units were completed and 19,000 units were shipped to customers.

The company uses four variance accounts:

Direct Material Variances
Direct Labor Variances
Fixed Overhead Variances
Variable Overhead Variances

The overhead rates used are:

Variable overhead = $2 × direct-labor dollars
Fixed overhead = $0.25 × direct-labor dollars

Required: Set up "T" accounts and prepare summary entries to record the given information.

24

Analysis of Cost Variances

IF A STANDARD cost accounting system is used, then the accountant has the task of analyzing the cost variances. This is the first step toward the goal of identifying the factors that caused the differences between the standard and actual costs so that the inefficiences can be eliminated.

Actual costs will differ from standard costs for many specific reasons (the wrong type of material was used, the material was the incorrect size, the machine was not adjusted correctly, too much material was used, etc.), but in general, variances for labor, material, and variable overhead will be either "price" or "efficiency" variances. Price variances will be caused by payment of a price higher or lower than the standard price (or wage rate). Frequently the firm will not be able to control the price it pays for a raw material or for labor, but there are exceptions. For example, material may be purchased from several suppliers who have different prices, different transportation costs, and different discounts for quantity purchases. In like manner, workers of several different pay grades may be able to perform a function. If only workers in the higher pay grades are employed, this may create a wage variance. Usually the "efficiency" variance will be more subject to control by management than the price variance; thus it should receive the greater attention.

Labor Variances. It has been suggested that the *actual* labor cost should be debited to a labor-in-process account and that the labor transferred from this account to finished goods (or to the next process) should be at a full standard. This means that the credit to the labor-in-process account will be obtained by multiplying the standard hours of labor by the standard rate of pay per hour. The difference between the actual labor cost incurred and the standard labor applied is the labor variance.

The labor variance must next be broken up into the part caused by paying higher than standard rates of pay (wage rate variance) and the part that is caused by working an excessive number of hours (efficiency variance).

The *wage rate variance* is equal to the *hours actually worked times the difference between the actual and standard wage rates.*

Wage rate variance = actual hours × (actual wage rate — standard wage rate)

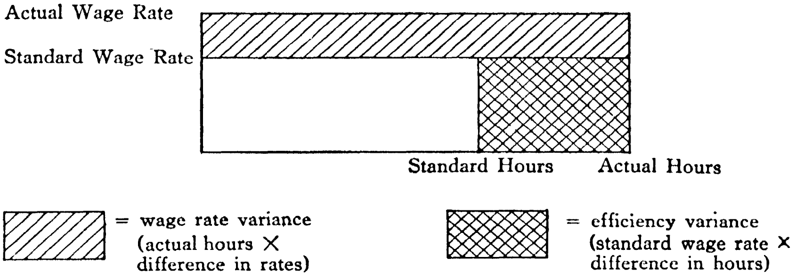
or

Wage rate variance = actual wages — standard wage rate × actual hours

The *efficiency variance* is equal to the *standard wage rate times the difference between the actual hours and the standard hours.*

Efficiency variance = standard wage rate × (actual hours — standard hours)

The wage rate variance gives that portion of the labor variance caused by paying an amount per hour other than the standard rate. The efficiency variance discloses the extra cost incurred because of hours worked in excess of standard hours, or the saving because less than the standard hours were worked. Note that if hours in excess of standard are worked, they are valued at standard wage rates for purposes of computing the efficiency variance. It is sometimes helpful to see the variances pictured graphically.


Actual Wage Rate
Standard Wage Rate
Standard Hours
Actual Hours
= wage rate variance (actual hours × difference in rates)
= efficiency variance (standard wage rate × difference in hours)

Computation of Standard Hours Worked. The total of standard hours worked is obtained by multiplying the equivalent units produced during the period by the current work standards (expressed in hours per unit). Before a product goes into production, engineers take out their boards, stop watches, and slide rules, and compute how many hours (or minutes) of labor is required to produce each end product and each component part. If the time required to produce Product A is 10 minutes, then the current work standard is 10 minutes. If there are 600 units of Product A produced during the period, then the standard units of labor are 6,000 minutes or 100 standard hours. Beginning and ending inventories are taken into consideration in the same manner as they were handled in computing equivalent units of product for process cost accounting.

Example

From the following information, compute the labor variances:

Work Standard per Unit for Product A	0.20 hr.
Equivalent Units of Product A Produced	100,000
Actual Hours of Direct-Labor Time	22,000 hr.
Actual Wages Paid to Direct Laborers	$45,000
Standard Wages per Direct-Labor Hour	$2
Budgeted Direct-Labor Hours for the Period	80,000 hr.

Solution: It should first be noted that the budgeted direct-labor hours do *not* enter into the solution of this problem. Budgeted direct hours (the budgeted level of activity for the period) do not affect the computation of labor variances.

The solution of this type of problem does not hinge on memorizing a series of formulas. It does require an understanding of the two variances.

Wage rate variance. This is the difference between the actual and standard wage rates applied to the total hours worked. The actual wage rate is equal to the actual wages ($45,000) divided by the actual hours (22,000).

$$\text{Wage rate variance} = 22{,}000\left(\frac{\$45{,}000}{22{,}000} - \$2\right) = \$45{,}000 - \$44{,}000 = \$1{,}000$$

The $1,000 wage rate variance is *unfavorable.*

Efficiency variance. This is the difference between the standard hours that should have been worked and the hours actually worked, valued at the standard wage rate.

$$\begin{aligned}\text{Efficiency variance} &= \text{standard rate} \times (\text{actual hours} - \text{standard hours})\\ &= \$2\,(22{,}000 - 20{,}000) = \$4{,}000\end{aligned}$$

The $4,000 efficiency variance is *unfavorable.*

The 20,000 *standard hours* of direct labor was obtained by multiplying the equivalent units produced by the work standard per units.

$$\text{Standard hours} = 100{,}000 \times 0.20 = 20{,}000 \text{ hr.}$$

Material Variances. Material variances are very similar to labor variances. The variance titles change slightly, for we now speak of price variance instead of wage rate variance, and usage variance instead of efficiency variance, but the computations are exactly the same.

$$\text{Material price variance} = \text{actual quantity} \times (\text{actual price} - \text{standard price})$$
$$\text{Material usage variance} = \text{standard price} \times (\text{actual quantity} - \text{standard quantity})$$

The standard quantity of material used is equal to the units produced times the standard material usage per unit of product. The importance of an accurate count of units produced cannot be overstressed, for it is the foundation of all efficiency variance computations. Firms often have difficulty getting accurate counts because human beings are subject to accidental and intentional errors. Mechanical counts often serve as a check, but unfortunately they are also subject to manipulation. The best check on reported production is the inventory of finished goods. If production reports are inflated, the ending inventory of finished goods will disclose this fact.

Equally important to good production counts are reliable material usage and labor work standards. If these are not carefully made out at the beginning of the accounting period, they can lead to faulty financial accounting as well as a blunting of the cost accounting system as a tool for controlling costs. One way of ensuring that the standards are reasonable is for the cost accountant actually to get into the plant and inspect the production process. In one situation where the cost accountant was using a material usage standard of 5 pounds, it should have been 0.5 pounds. This error in placing of the decimal point would have been caught sooner if the accountant had been familiar with the manufacturing process and the product being made.

Example

Compute the material variances from the following information:

The ending inventory of work in process is equal to the beginning inventory.

Material Standard per Unit of Product	0.50 lb.
Equivalent Units of Product Produced	100,000
Actual Quantity of Material Used	46,000 lb.
Actual Cost of Material Used	$135,000
Standard Cost per Pound	$3

Solution: Material price variance is the difference between the actual and standard prices per unit of material applied to the actual quantity of material used.

The actual cost per pound is equal to the actual cost incurred, divided by the actual quantity used.

$$\text{Material price variance} = \text{actual quantity} \times \left(\frac{\text{actual cost incurred}}{\text{actual quantity}} - \text{standard price}\right)$$

$$\begin{aligned}\text{Material price variance} &= 46{,}000\left(\frac{\$135{,}000}{46{,}000} - \$3.00\right)\\ &= \$135{,}000 - \$138{,}000\\ &= \$3{,}000 \textit{ favorable variance}\end{aligned}$$

Material usage variance is the difference between the actual quantity used and the amount that should have been used, valued at standard prices.

$$\begin{aligned}\text{Material usage variance} &= \text{standard price} \times (\text{actual quantity} - \text{standard quantity})\\ \text{Material usage variance} &= \$3.00\ (46{,}000 - 50{,}000)\\ &= \$12{,}000 \textit{ favorable variance}\end{aligned}$$

The 50,000 pounds (standard quantity) was obtained by multiplying the units produced by the material standard.

Standard quantity = 100,000 × 0.50 = 50,000 lb.

If there had been changes in work in process, then this would have had to be taken into consideration in computing the standard usage of material.

Overhead Variances. To analyze overhead variances, it is first necessary to separate the overhead incurred and the overhead applied to product into fixed and variable overhead. The variances for fixed and variable overhead are computed individually.

The following discussion assumes that the actual overhead costs will be debited to two accounts, "Fixed Overhead Incurred" and "Variable Overhead Incurred." The overhead will be applied to in-process accounts, using the actual direct-labor hours worked times fixed and variable overhead rates. The overhead will be transferred from the in-process accounts to a finished goods account, using the standard direct-labor hours worked and the same overhead rates as used in the first transfer. The variances will be found in the overhead incurred and the in-process accounts.

Variable Overhead Variances. There are two variable overhead variances, the budget variance and the efficiency variance. They are analogous to the price and efficiency variances encountered in labor and material. The efficiency variance occurs because the actual hours worked differed from the standard hours. A budget variance occurs when the actual variable overhead incurred differs from the variable overhead budgeted for the actual level of operations.

Efficiency variance = variable overhead rate × (actual hours − standard hours)
Budget variance = actual variable overhead − (actual hours × variable overhead rate)

The amount left in the "Variable Overhead Incurred" account after the transfer to the in-process account will be the budget variance. The debit to the account is the actual overhead incurred, and the credit is the actual hours times the standard variable overhead rate.

The efficiency variance may be found in the "Variable Overhead in Process" account. The debit to this account is the same as the credit to the overhead incurred account (actual hours × variable overhead rate). The transfer from this account is the variable overhead rate times the standard hours; thus, the balance in the account will be the efficiency variance for the variable overhead.

Fixed Overhead Variances. In addition to two variances similar to the budget and efficiency variances encountered in variable overhead, there is another variance, an *idle capacity variance,* which is encountered when analyzing the fixed overhead variances. This variance is caused by the fact that an amount of time other than the budgeted hours was worked. The use of a predetermined fixed overhead rate will result in a balance in the "Fixed Overhead Incurred" account. Thus, there will be two variances in that account (the budget variance and the idle capacity variance) and they have to be separated. This is accomplished by turning the definitions of the variances into formulas and applying the formulas.

$$\begin{aligned}
\text{Budget variance} &= \text{actual fixed costs} - \text{budgeted fixed costs}\\
\text{Idle capacity variance} &= \text{fixed overhead rate} \times (\text{budgeted hours} - \text{actual hours})\\
\text{Efficiency variance} &= \text{fixed overhead rate} \times (\text{actual hours} - \text{standard hours})
\end{aligned}$$

The formula for the efficiency variance is unchanged from that for variable costs except that the fixed overhead rate is used instead of the variable overhead rate. The significance of the variance is changed, however. The fixed overhead efficiency variance does not have much usefulness. The budget variance is important because it shows the difference between actual and budgeted fixed costs. The idle capacity variance is of use because it points up the problem of overcapacity. The efficiency variance for fixed overhead cost accomplishes a minor purpose. It shows that part of the fixed overhead was not assigned to product because the actual number of hours worked differed from the standard number of hours.

There is actually one additional fixed overhead variance, the *calendar variance.* This occurs when the number of working days in each month is different. In this text this complication is assumed not to exist so that the overhead problem will not be further complicated. The calendar variance is buried in the idle capacity variance.

Example

Part I. From the following information, compute the manufacturing overhead rates. Use normal activity. All costs listed are manufacturing costs.

Budgeted Variable Costs (for 80,000 direct-labor hours)	$20,000
Budgeted Fixed Costs	$40,000
Normal Activity	80,000 direct-labor hours

Solution:

$$\text{Variable overhead rate} = \frac{20{,}000}{80{,}000} = 0.25 \text{ per direct-labor hour}$$

$$\text{Fixed overhead rate} = \frac{40{,}000}{80{,}000} = 0.50 \text{ per direct-labor hour}$$

Part II. From the preceding information given and that which follows, compute the variable and fixed overhead variances.

Actual Hours Worked	22,000 hr.
Standard Hours	20,000 hr.
Actual Variable Overhead Costs Incurred	\$5,100
Actual Fixed Overhead Costs Incurred	\$39,800

Solution: Efficiency variance is the difference between the actual and standard hours valued at the applicable overhead rate.

$$\begin{aligned}\text{Variable overhead efficiency variance} &= 0.25\ (22{,}000 - 20{,}000)\\ &= \$500\ \textit{unfavorable}\\ \text{Fixed overhead efficiency variance} &= 0.50\ (22{,}000 - 20{,}000)\\ &= \$1{,}000\ \textit{unfavorable}\end{aligned}$$

Budget variance is the difference between what the overhead should have been and the actual overhead incurred. The budgeted variable overhead has to be adjusted to the actual level of operations.

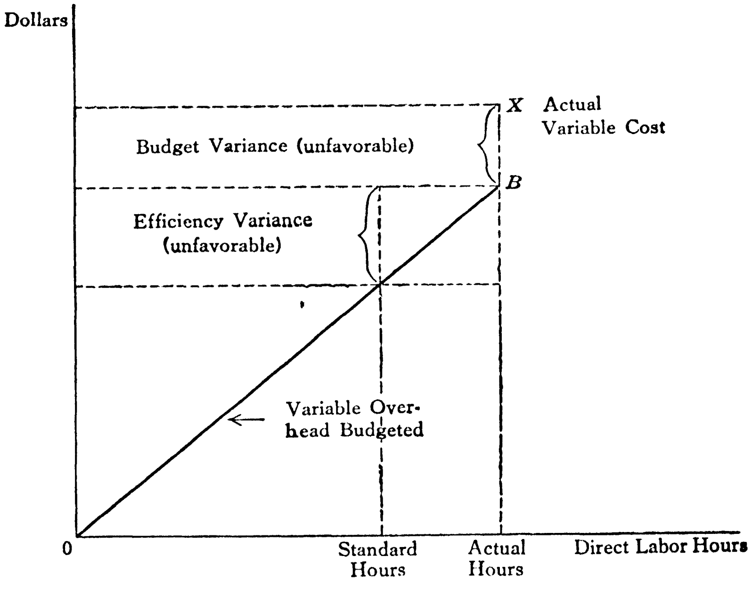
$$\begin{aligned}\text{Variable overhead budget variance} &= 22{,}000 \times 0.25 - \$5{,}100 = 5{,}500 - 5{,}100\\ &= \$400\ \textit{favorable}\\ \text{Fixed overhead budget variance} &= 40{,}000 - 39{,}800 = \$200\ \textit{favorable}\end{aligned}$$

Idle capacity variance is the difference between the actual and budgeted hours valued at the fixed overhead rate.

$$\text{Idle capacity variance} = 0.50\ (80{,}000 - 22{,}000) = \$29{,}000\ \textit{unfavorable}$$

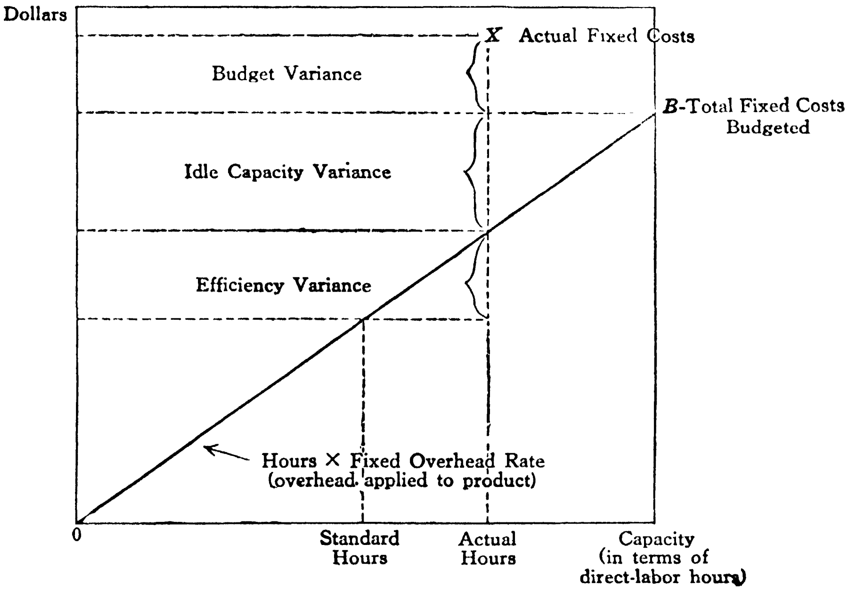
The foregoing examples for labor, material, and overhead variances are all related. Taken as a unit, they are an example of a problem in the analysis of all cost variances.

Graphical Solutions. Graphical solutions of the problems of computing the fixed and variable variances may be used. They are especially useful for purposes of enabling the student to visualize the relationships of the variances that have been discussed.


Dollars
X
Actual Variable Cost
Budget Variance (unfavorable)
B
Efficiency Variance (unfavorable)
Variable Overhead Budgeted
0
Standard Hours
Actual Hours
Direct Labor Hours

The line *OB* of the graphical solution for the variable overhead variances is the variable overhead budgeted for the different levels of activity, and it is also the amount of overhead that will be applied to product for different hours of activity. Thus, for any amount of *standard direct-labor hours,* the amount of variable overhead to be applied to product may be found by the intersection of *OB* and a vertical line extended up from the appropriate amount (standard direct-labor hours) on the *X* axis. For any amount of *actual direct-labor hours* the variable overhead that should have been incurred (the budgeted amount) can be found by the intersection of *OB* and a vertical line extended up from the appropriate amount (actual direct-labor hours) and the *X* axis.

When attention is shifted to the graphical solution for fixed overhead variances, the line *OB* on that chart has somewhat more limited significance. It no longer represents the budgeted costs for different levels of activity. This is reasonable, since the costs are fixed over the entire range of activity being studied and are represented by a horizontal line. Thus the line *OB* on the chart for fixed costs represents the amount of fixed overhead that will be absorbed by product at different levels of standard direct-labor hours.



Favorable and Unfavorable Variances. Variances may be either favorable or unfavorable. Unfavorable variances will result when actual costs (or hours) are greater than standard costs (or hours) or budgeted costs. Favorable variances will occur when the actual costs (or hours) are less than the standard costs (or hours). The idle capacity variance will almost always be unfavorable if the practical capacity is chosen as the level of activity for computing the fixed overhead rate. It may or may not be favorable if some other basis is chosen or if the practical capacity can be exceeded.

Whether a variance is favorable or unfavorable can also be decided by inspection of the accounts. If there is a debit balance, the variance is unfavorable (tending to decrease the stockholders' equity). If there is a credit balance, the variance is favorable (tending to increase the stockholders' equity).

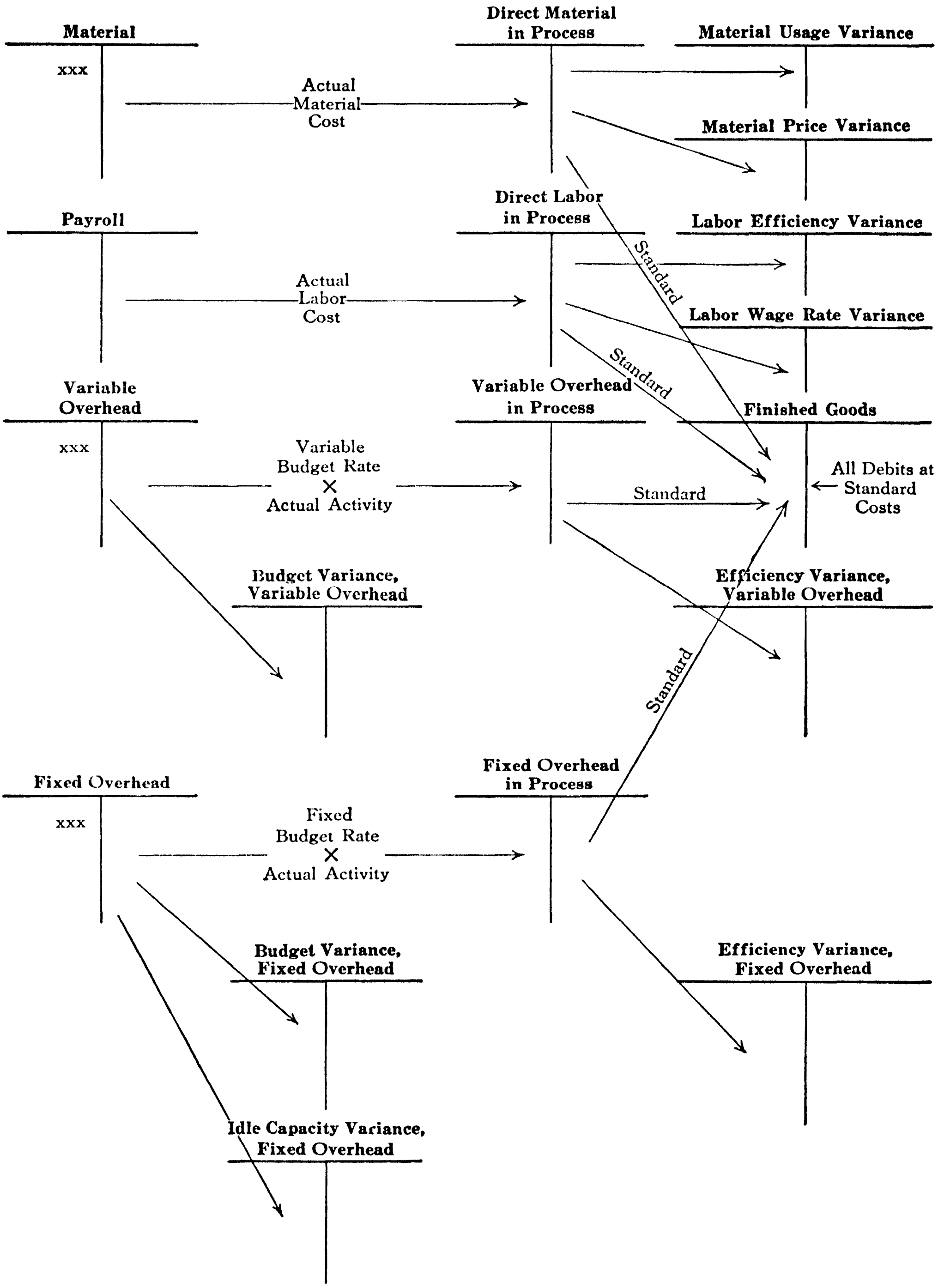
Significance of Variances. Management cannot investigate each and every variance. There must be criteria established that determine whether the variance is significant enough to be investigated. The absolute size of the variance may be one factor, the size of the variance relative to the total cost incurred in that classification may be another, and the characteristic of the cost is a third consideration. These criteria are best established by someone other than the person responsible for the operations, and by someone with a knowledge of statistics, for this problem of determining significance can be handled by using statistical techniques.

It should be remembered that the analysis of variances illustrated in this chapter is only the first step. Once the budget variance is computed, the causes for the variance will be investigated in detail. For example, the actual cleaning expense will be compared with the budgeted expense.

Disposition of Variances. Cost variances may be disposed of by following either of two basic procedures. They can be considered a cost of inefficiency and not a cost of product and thus can be charged against the revenues of the period. Or they can be considered a cost of product and thus can be allocated to work in process, finished goods, and cost of goods sold. The proper procedure is to judge each variance individually and to make a decision based on the nature of the cause of the variance. In general, price variances caused by changes in the prices in goods are a cost of product and therefore should be allocated to product. At the other extreme is an idle capacity variance caused by operating 100 direct-labor hours instead of the normal 800 direct-labor hours per week. This is a cost of idleness, not a cost of the product made. In between the two extremes are borderline cases where it is not possible to determine with certainty whether the cost should be considered as a cost of product. Labor efficiency variances are of this nature, especially if the labor standards are very tight.

Of more importance than the exact treatment of specific variances is an appreciation of what is affected by the choice of procedure. Both the inventory valuation and the measurement of income will be affected. The control of costs is not directly affected, since the cost variances should be analyzed in the same manner without regard to their ultimate disposition. Practical considerations, such as recording costs, may result in expensing all variances.

Summary Diagram of Flow of Entries—Standard Cost System. The following diagram is an attempt to present the accounts of a possible standard cost system. The reader should realize that there are many alternative possibilities.


Material
xxx
Actual Material Cost
Direct Material in Process
Material Usage Variance
Material Price Variance
Payroll
Actual Labor Cost
Direct Labor in Process
Labor Efficiency Variance
Standard
Labor Wage Rate Variance
Variable Overhead
xxx
Variable Budget Rate × Actual Activity
Variable Overhead in Process
Standard
Standard
Finished Goods
All Debits at Standard Costs
Budget Variance, Variable Overhead
Efficiency Variance, Variable Overhead
Standard
Fixed Overhead
xxx
Fixed Budget Rate × Actual Activity
Fixed Overhead in Process
Budget Variance, Fixed Overhead
Efficiency Variance, Fixed Overhead
Idle Capacity Variance, Fixed Overhead

QUESTIONS AND PROBLEMS

24–1. The Bobb Company

The Bobb Company makes one product. The following data are accumulated for the month of July. Overhead is absorbed, using direct-labor hours.

	Standard	*Actual*	*Budgeted*
Hours of Direct Labor	95,000	90,000	100,000
Dollars of Direct-Labor Cost	$190,000	$185,000	$200,000
Pounds of Material A Used	76,000	75,000	80,000
Dollar Amount of Material A Used.	$228,000	$228,000	$240,000
Variable Manufacturing Overhead		$82,000	$100,000
Fixed Manufacturing Overhead		$47,500	$50,000
Units of Equivalent Product	38,000	38,000	40,000

Required: Compute the material, labor, and overhead variances.

24–2. The Thrower Company

The Thrower Company produces one product. For the month of March, the following information is accumulated:

	Actual Hours and Tons	Standard Hours and Tons	Actual Cost	Standard Cost per Unit
Direct Labor	10,500 hr.	10,000 hr.	$21,500	$ 2.10 per hr.
Direct Material	550 tons	540 tons	52,250	100.00 per ton

	Budgeted Overhead for Year	Actual Overhead for March
Variable	$216,000	$15,200
Fixed	72,000	6,200

The overhead is budgeted for average (normal) activity of 144,000 hours of direct labor per year.

Required

(a) Compute the labor and material variances.
(b) Compute the overhead variances.
(c) Show the overhead variances graphically.
(d) Assuming no beginning or ending balances in work in process, set up necessary "T" accounts to show the entries that would be made to record the manufacturing costs and variances. Set up a separate "T" account for each variance.

24–3. The Pitcher Company

The Pitcher Company produces one product. For the month of March, the following information is accumulated:

	Actual Usage	Standard Hours and Tons	Actual Cost	Standard Cost per Unit
Direct Labor ...	11,000 hr.	10,000 hr.	$22,500	$ 2.10 per hr.
Direct Material ..	530 tons	540 tons	52,650	100.00 per ton

	Budgeted Overhead for Year	Actual Overhead for March
Variable	$288,000	$20,900
Fixed	144,000	13,200

The overhead is budgeted for average (normal) activity of 144,000 hours of direct labor per year.

Required

(a) Compute the labor and material variances.
(b) Compute the overhead variances.

24–4. The Auburn Company

The Auburn Company manufactures one product, *Bypo*. The standards for one unit of product Bypo are as follows:

10 lb. of material *X* at $1 per lb.	$10
3 hr. of direct labor at $3 per hr.	9
Burden	
Fixed: $2 per direct-labor hour	6
Variable: $1 per direct-labor hour	3
Total standard cost for one unit of Bypo	$28

Material *X* is added at the beginning of the manufacturing process. Burden is budgeted on the basis of direct-labor hours.

The inventory of work in process on February 1, 1957, consisted of 900 units of Bypo, 66⅔% complete with regard to labor and burden. A purchase of 92,000 pounds of material *X* was made during February at a cost of $1.05 per pound. During the month 26,000 hours of direct labor were worked at an average wage of $3.10 per hour. February plant capacity was 30,000 direct-labor hours. Actual fixed burden costs amounted to $63,000 during February, and actual variable burden costs amounted to $26,000 during the month.

During February 8,900 units of Bypo were completed. The inventory of work in process as of February 28 consisted of 1,000 units of Bypo, 80% complete with regard to labor and burden.

Required: Compute labor, material, and overhead variances for the month of February. Indicate whether the variances are unfavorable (debit) or favorable (credit).

24–5. The I.C. Thelite Company

The I.C. Thelite Company has accumulated the following information in an effort to explain the differences between standard and actual cost for the month of March. Overhead is absorbed, using standard direct-labor hours. All the actual costs given are for March. There is no beginning or ending balance in work in process.

Production for March

Product	Equivalent Units Produced	Direct-Labor Standards	Standard Direct-Labor Cost per Hour	Material Standards	Standard Material Cost per Ton
A	900,000	6.0 min. per unit	$2.10	1.0 lb. per unit	$100.00
B	800,000	4.8 min. per unit	2.20	3.0 lb. per unit	200.00

Actual Direct Labor and Material

Product	Direct-Labor Hours	Direct-Labor Dollars	Material Tons	Material, Dollars
A	80,000	$164,000	530	$ 54,500
B	70,000	190,000	1,248	259,000

Budget Information

Product	Budgeted Fixed Cost, March	Budgeted Production, March	Budgeted Variable Overhead, March	Budgeted Direct-Labor Hours, March
A	$150,000	1,000,000	$200,000	100,000
B	340,000	850,000	170,000	68,000

Additional Information

Product	Actual Fixed Cost, March	Actual Variable Cost, March
A	$148,000	$210,000
B	343,000	168,000

Required: Prepare an analysis of all variances. Overhead is applied to product, using direct-labor hours.

24–6. The Carter Corporation

The Carter Corporation makes one product, widgets, and uses a standard cost system to record the costs of making that product. On December 1, 1958, manufacturing inventory accounts had balances as follows:

Finished Goods	$18,000	1,000 units
Work in Process, Labor ...	1,000	500 units one-half completed
Work in Process, Material .	5,000	500 units completed as far as material is concerned.
Work in Process, Overhead	1,000	The overhead rate is $2.00 per direct-labor hour.

The standard cost of a widget is:

Direct Labor	$ 4
Direct Material (20 lb. of material)	10
Overhead	
Fixed	3
Variable	1
	$18

The current work standard is 2 direct-labor hours per unit of product. The fixed overhead rate is $1.50 per direct-labor hour, and the variable overhead rate is $0.50 per direct-labor hour.

The normal activity for a month is 200,000 direct-labor hours, and the overhead rates are based on normal activity. The fixed manufacturing costs budgeted for a month are $300,000, and the variable manufacturing overhead costs are $100,000.

The following transactions took place during December:

Direct-Labor Costs Incurred (180,000 hr. of work)	$ 380,000
Material Requisitioned and Used (1,800,000 lb.)	1,150,000
Fixed Overhead Incurred	320,000
Variable Overhead Incurred	95,000
Selling Expenses Incurred	1,000,000
Administrative Expenses Incurred	800,000
Income Taxes	100,000
Sales on Account (95,000 widgets)	4,800,000

During the month of December the plant completed 100,000 units of product. The work in process on December 31 consisted of 400 units, 50% completed as far as labor and 100% completed as far as material.

Required

(a) Record in "T" accounts the transactions of December, including the adjusting entries.

(b) Give the ending inventories in finished goods and work in process.

(c) What additional information should be obtained for purposes of controlling costs?

25

Administration of the Budget Program

WHAT IS A budget? First we should realize that there is no such thing as *a* budget, but rather a series of budgets, each made for a specific purpose. The entire subject of cost control is based on the assumption that the budgeted costs establish a standard of a high level of efficiency. This type of budget is useful for cost control purposes but is not useful for forecasting cash needs or *probable* income. Thus there are essentially two types of budgets. One is a *forecast,* which tells where you are likely to be, and the other is a *standard,* which tells whether or not the predetermined high level of efficiency is being maintained.

The Budget Committee. Preparation of the budget is not the sole responsibility of any one department. To be useful, the budget must be prepared by the department to which it applies. Thus the production department prepares the production department expense budget, and the sales department prepares the budget for the sales department expense. Obviously the budget preparation must have some central guidance. This is often supplied by a budget committee.

The budget committee should consist of the heads of the various departments or other high level executives. Its prime task is to see that the budgets are realistically established. If a department submits a budget that does not reflect a high level of performance, the budget should not be approved by the budget committee. It should be sent back to the originating department with comments. The originating department should either adjust the original budget or attempt to defend it. If the budget is adjusted perfunctorily merely to "please" the budget committee, then this will cause unfavorable cost variances to appear throughout the fiscal year, and these will require explanations. It is very important that all parties agree that the budgeted costs can be attained and are not an impossible goal. This is the prime reason for not having the accounting department prepare all budgets.

If this were done, the operating departments might well say that the budgets are meaningless, since they were prepared by a group of people sitting at desks who do not understand the problems of production. By having the departments prepare their own budgets, this weakness is avoided.

Usually, the budget committee will appoint a budget officer. This executive is responsible for seeing that the budget system actually works. The budget officer may be an accountant or an executive familiar with accounting, since the accumulation of the budget information is very much related to the problems of accounting.

In the absence of a budget committee the budget officer may well assume the tasks which the budget committee normally would carry out. His main task would be coordinating and gaining the full cooperation of all departments. The budget committee accomplishes this by giving all departments a seat on the budget committee. Without the budget committee the budget officer must consciously create a situation where all departments realize their responsibility for the budget. If the situation becomes one where the budget officer or the accounting department prepares the budget, a large percentage of the usefulness of the budget is lost.

Budget Manual. Budget manuals are useful because they place the objectives and procedures of the budget program in writing. This is helpful because it provides a reference source for the questions of the personnel responsible for preparing the budget. The danger of a manual is that current procedures may be radically different from the written instructions. This should be avoided, since it tends to add to the confusion surrounding an already difficult procedure. The budget manual should always be kept up to date. One way of accomplishing this is to have the budget manual take the form of a collection of loose-leaf pages in a binder. When procedures are changed, a new page should be issued to change the budget manual.

Cost Control Use of the Budget. The use of the budget as a cost control device will be covered in Chaps. 26 and 30. Here, it is necessary to stress the fact that the budgeted costs should reflect a high level of efficiency. How can this be reconciled with the other uses of the budget? The reconciliation is accomplished through the use of forecasted variance accounts. If the standard has been established, but if it is very unlikely that the standard will be attained, then a cost variance should be budgeted. This forecasted variance will be used for purposes of forecasting but will not be used for purposes of cost control.

Forecasting Uses of the Budget—The Sales Budget. The budget has many uses as a forecasting device. By using the budgeted costs, the income resulting from a certain course of action can be predicted. This is extremely useful, since it enables management to change its strategy before the event has occurred, rather than after it has occurred. Also, by knowing where it should be going, management can tell immediately (by comparing the budgeted cost or income with the actual cost or income) when its plans are not being realized.

The budget can also be useful in planning material purchases, hiring employees, scheduling production, and arranging for the supply of sufficient cash to accomplish the production plan. To be useful for all these purposes, we need more than a "flexible" budget. We need to know the predicted sales for each of the coming months. The sales forecast is the backbone of the forecasting budget. It is not within the scope of this chapter to do more than mention some of the methods of predicting sales. However, there is abundant literature on this subject if the reader should desire to investigate it further.

Sales forecasts based on:
  Estimates of Salesmen
  Estimates of Sales Managers
  Economic Analysis

These forecasts may be based on:

  Past Sales (Demand Analysis) and Prospective Pricing Policy
  Prediction of General Business Activity
  Outside Factors (growth in population, shifting habits, etc.)
  Interviews with Clients
  Unfilled Orders

A sales forecast or sales budget should be made out for each product. The sales of the various products for each geographical location should be forecasted, and finally the sales by the types of customer (government, wholesalers, retailers, etc.) should also be predicted. This information should be summarized in various ways so that information of the following nature is readily available: total sales by geographical location and total sales to the various types of customer; the same information should be applied for each different type of product.

Selling and Distribution Cost Budgets. The selling and distribution cost budget is directly related to the sales budget. Sales will be determined to some extent by the amount spent for selling effort, and distribution costs will be a function of the units sold. The sales budget can not be made out until the advertising budget and sales expense budget have been decided upon, since sales will be a function of the selling effort.

Cash Budgets. It is extremely important that the *right* amount of cash be provided for operating the business. If there is not enough cash, then it may be necessary to curtail operations. If there is too much cash, then the firm is paying for money that it is not using. For this reason the cash budget is extremely important to the executive in charge of ensuring that there is just the right amount of cash available.

One possible method of preparing a cash budget is to construct "T" accounts which reflect the probable operations of the next period. By making summary entries to the cash account, the projected balance may be obtained. The debits to the cash account represent *sources* of cash, and the credits represent *application* of cash. One of the problems is to forecast the timing of the cash receipts and disbursements. With the assistance of past experience this is not an insurmountable problem.

Example

Compute the expected cash receipts for May. Collections from customers follow the below pattern:

60% in the month of sale,
30% in the month following the sale,
8% in the second month following the sale,
2% bad debts.

Forecasted Sales:

January	$ 60,000
February	70,000
March	80,000
April	100,000
May	90,000

Solution

May Receipts

From May Sales,	90,000 × 60%	= $54,000
April Sales,	100,000 × 30%	= 30,000
March Sales,	80,000 × 8%	= 6,400
Total		= $90,400

Production Budget. The production budget may be made out as soon as the sales budget is prepared and the inventory policy of the next period is decided upon. The production manager will attempt to stabilize production to minimize interruptions of the production stream which tend to decrease efficiency. Production budgets will be made out by departments and will show the different amounts of product to be made in the different time periods.

The production in any period may be computed by applying the basic equation:

Production = desired ending inventory + unit sales — opening inventory

Example

Compute the required production for the first quarter assuming either: (a) it is desired to keep an ending inventory of 500 units; (b) it is desired to stabilize production at 600 units per month; (c) it is desired to have on hand at the end of each month an amount equal to one month's sales. The inventory at the beginning of the year is 500 units. The projected sales are:

January	400 Units
February	300
March	500
April	700

Month	(1) Desired Ending Inventory	(2) Unit Sales	(3) Opening Inventory	(4) Production for Month *
(a)				
January	500	400	500	400
February	500	300	500	300
March	500	500	500	500
(b)				
January	——	400	500	600
February	——	300	700	600
March	——	500	1,000	600
(c)				
January	300	400	500	200
February	500	300	300	500
March	700	500	500	700

* Col. 4 = Col. 1 + Col. 2 — Col. 3 except for part (b).

The Production Cost Budgets. The production cost budgets consist of three budgets:

Direct-Labor Budget
Direct-Material Budget
Overhead Budget

For forecasting purposes these three budgets are based on the production budget, which in turn is based on the sales budget. Since they are used for cost control purposes, the three budgets are flexible budgets and are adjustable to the actual level of operations.

Both the direct-labor and direct-material budgets are computed by applying *standards* to the number of units to be produced. Thus, if the current work standard is 0.5 hour of direct labor per hour per unit of Product A, then the budgeted direct labor for 1,000 units of Product A would be 500 hours (1,000 units times 0.5 hour per unit). If there were only 800 units of Product A produced, then the actual hours of direct labor would be compared with 400 hours (800 units times 0.5 hour per unit). The standard hours can be converted to dollars by multiplying by the standard direct-labor hour-wage rate.

The material budget is computed in the same manner as the labor budget. If the standard material per unit of Product A is 1.5 pounds, then the budgeted material for 1,000 units of product will be 1,500 pounds. This can be converted into dollars by multiplying by the standard cost per pound of the material being used to make Product A.

The overhead budget is somewhat more difficult to prepare because overhead costs may be fixed, variable, or semi-variable. Semi-variable is used here to represent all costs that are not fixed over the entire range of production or which do not vary directly with production. The person preparing the budget should indicate whether the costs are fixed, variable, or semi-variable. If the costs are fixed or variable, they are relatively simple to handle, but if they are semi-variable, then they are more difficult to incorporate into the budget cost control system. One way of handling semi-variable costs is to have the budget preparation sheet take the following form:

BUDGET—SEMI-VARIABLE COSTS

Account Number	Account Title	Indicate the Total Cost for Each Level of Activity:					
		40-Hr. Week	Number of Employees	60-Hr. Week	Number of Employees	80-Hr. Week	Number of Employees

For purposes of cost control the actual cost incurred will be compared with the cost budgeted at the applicable level of activity. Some semi-variable costs will be linear. These will be no problem, since the budgeted cost at the actual level of activity may be easily computed, or the cost may be plotted on a graph. If the cost is nonlinear (it does not increase in a continuous manner), then the accompanying form will be useful, and while the actual hours worked may not be 40, 60, or 80, it will be possible to interpolate. The advantage of this system is that it forces production personnel to think in terms of what the various costs should be for different levels of activity.

For purposes of absorbing the costs to product and computing overhead rates, the choice of the level of semi-variable costs will depend on the choice of level of activity chosen for purposes of cost absorption (see Chapter 22 on overhead). If 80 hours were practical capacity and if practical capacity were being used for purposes of absorbing fixed costs, it would also be used to absorb semi-variable costs. Thus the costs at 80 hours of activity would be added and divided by 80 to find the semi-variable costing rate per direct-labor hour.

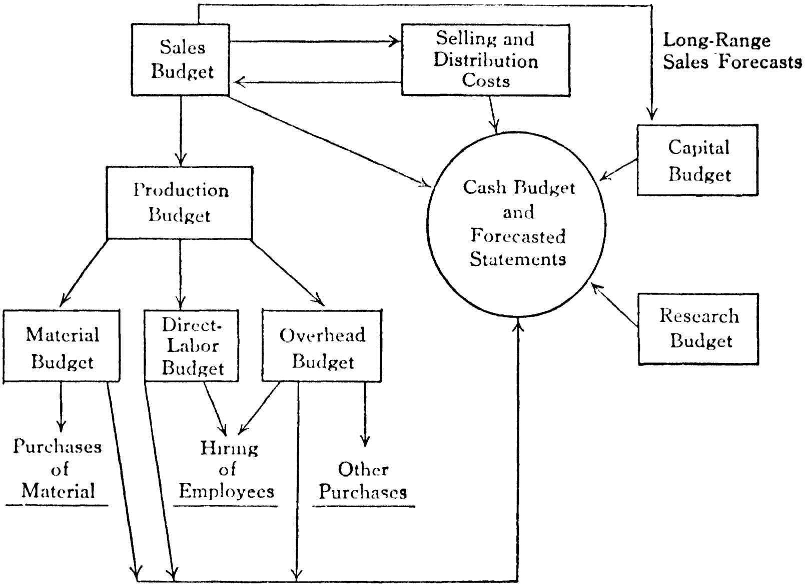
Capital Expenditures Budget and Research Budget. Since the capital expenditures budget is the subject of Chapter 34, the subject will not be reviewed here. The research budget is used more for planning purposes than for cost control purposes. It gives those executives in charge of research an indication of the resources at their disposal. It may also indicate the direction in which the research should go, although this is less a part of the budget program than a general management problem.

The Budget Period. For how far ahead should budgets be prepared? Sales and production budgets are commonly made 12 months in advance and then adjusted monthly or quarterly. The forecast for each month should definitely be reviewed before the beginning of the month.

Budgets of capital expenditures should be made out for periods as far as 5 to 10 years ahead. To prepare these budgets, estimates of sales and costs that far in advance will also have to be made so that the desirability of the various capital expenditures may be judged. Thus short-range forecasts of one month and long-range forecasts of 10 years will have to be made simultaneously.

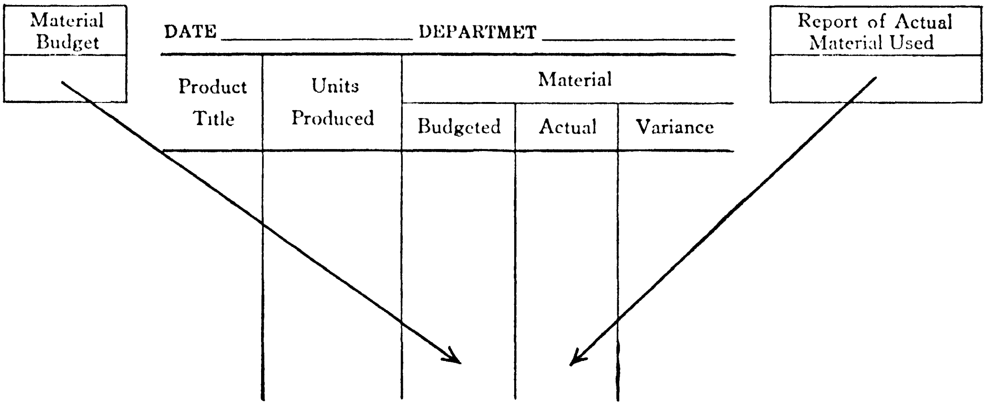
Budget Summaries. Practically every report prepared from actual accounting data is also prepared by using the budget forecast data. Thus there will be budgeted income statements, position statements, and funds statements. A possible method of tackling the problem of preparing these reports is to set up the accounts and to record the forecasted transactions in summary form.

Interrelationships of the Various Budgets. The following diagram attempts to illustrate the interrelationships of the different budgets. The arrows indicate flows of relevant information. Thus, to prepare the production budget, it is necessary to have the information from the sales budget.

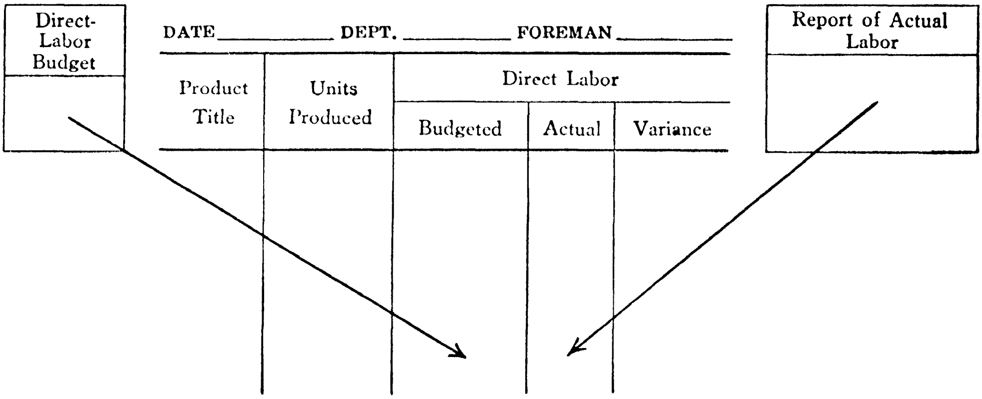

Sales Budget
Selling and Distribution Costs
Long-Range Sales Forecasts
Capital Budget
Production Budget
Cash Budget and Forecasted Statements
Material Budget
Direct-Labor Budget
Overhead Budget
Research Budget
Purchases of Material
Hiring of Employees
Other Purchases

Interrelationships of the Budget, Actual Costs, and Cost Control Reports. The preceding section illustrated the preparation of the budget and how the preparation of one budget influenced the preparation of the other budgets. This section is concerned with the use of the material, labor, and overhead budgets for cost control purposes. It should be recognized that instead of "budgeted" direct labor and material, the terms *standard direct labor* and *standard material* are frequently used. This is a matter of terminology and does not affect the use of the reports.

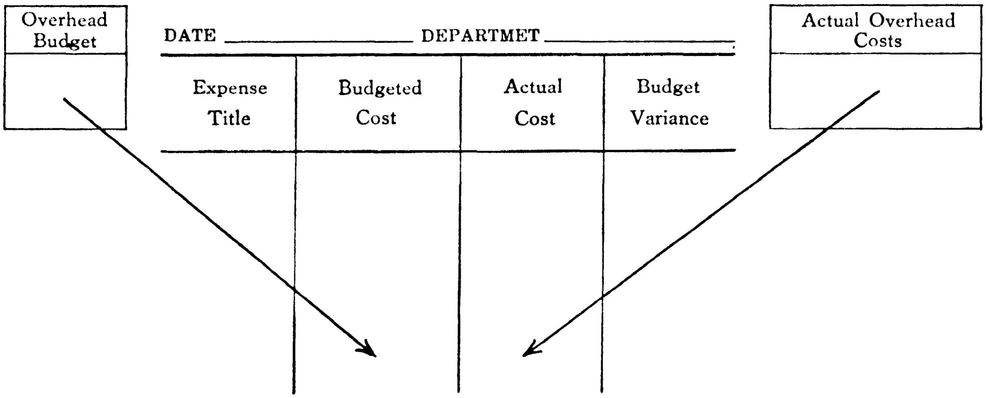
MATERIAL USAGE REPORT


Material Budget
DATE
DEPARTMET
Report of Actual Material Used
Product Title
Units Produced
Material
Budgeted
Actual
Variance

LABOR EFFICIENCY REPORT


Direct-Labor Budget
DATE
DEPT.
FOREMAN
Product Title
Units Produced
Direct Labor
Budgeted
Actual
Variance
Report of Actual Labor

OVERHEAD BUDGET VARIANCE REPORT


Overhead Budget
DATE
DEPARTMET
Expense Title
Budgeted Cost
Actual Cost
Budget Variance
Actual Overhead Costs

QUESTIONS AND PROBLEMS

25–1. The Kracked Bat Company

Each December the Kracked Bat Company prepares a series of budgets for the coming year. The complete budget has the following components:

Sales and Selling Expenses
Production Budget
Material and Labor Budgets
Manufacturing Overhead Budget
Cash Budget
Projected Financial Statements

The Kracked Bat Company's only products are baseball bats. The bats are all produced at one plant. There are four sales offices. The company uses a LIFO procedure for pricing inventory and cost of goods sold expense.

Part I. Sales and Selling Expense Budgets

The sales and selling expense budgets are prepared by the sales department with the assistance of the controller's office. The sales forecasts are based on reports from the salesmen and information from the company economist whose task it is to incorporate into the forecast such things as changes in prices, population, age of the population, and income. For the year 1958 the following projections were made:

SALES PROJECTIONS FOR 1958

Sales District	Number of Bats	Sales in Dollars	Budgeted Selling Expense
New England	500,000	$1,500,000	$20,000
Middle West	300,000	900,000	18,000
South	150,000	450,000	10,000
South West	50,000	150,000	12,000
	1,000,000	$3,000,000	$60,000

Required: What additional information should be contained in the completed sales budget and selling expense budget?

Part II. Production Budget

The production department receives from the sales department a breakdown of forecasted sales by months.

Sales Projections for 1958
By Months (number of bats)

January	200,000	July	Vacation
February	200,000	August	60,000
March	100,000	September	60,000
April	100,000	October	100,000
May	50,000	November	40,000
June	50,000	December	40,000

The company follows a policy of stabilizing employment throughout the year. If it did not follow this policy, it would probably lose its skilled workers to other plants in the area. Studies and experience indicate that the plant can produce 60,000 bats a month when it is operating without overtime and employing only the basic work force. By working overtime and adding temporary workers, production can be upped to 120,000 bats a month. The entire plant and sales force is given a month's vacation in July. Normal activity for budget purposes is 100,000 bats a month.

There will be a January 1, 1958, beginning inventory of 180,000 bats. The company tries to keep a basic minimum inventory of 20,000 finished bats, and it builds up the inventory to 180,000 bats as of the beginning of each year. Where there is conflict between inventory control and employment policy, the stabilized employment policy has priority.

Required: Plan the production (number of bats) to be produced in each month.

Part III. Material and Labor Budgets

The material and labor standards for the type of bat being produced are as follows:

Wood (standard rough weight)	2 lb.
Standard Cost per Pound	$0.10
Standard Cost of Wood Used in Bat	$0.20

Direct Labor:			
Cutters	0.25 hr.	at $2.00 per hr. =	$0.50
Finishers	0.50 hr.	at $3.00 per hr. =	1.50
Standard Direct-Labor Cost per Bat		=	$2.00

Required: Compute the total direct labor and material to be used during the year, and also for each of the first three months of the year.

Part IV. Manufacturing Overhead Budget

The manufacturing overhead costs are budgeted as follows:

Fixed Overhead

Equipment Depreciation	$ 24,000
Salaries of Supervisors	180,000
Building Rent	96,000
Manufacturing Labor, Indirect	36,000
Manufacturing Supplies	24,000
	$360,000

Variable Overhead
(for normal activity of 1,200,000 bats per year)

Indirect Labor	$ 96,000
Power	24,000
Indirect Supplies	48,000
	$168,000

Required

(a) What additional information should be presented in the detailed budget?
(b) Compute the fixed and variable overhead rates to be used for 1958. Overhead is to be absorbed, using direct-labor hours.
(c) What is the standard overhead per unit of product?

Part V. Cash Budget

The only sources of cash in the next period are sales and the collections of accounts receivable. Past experience indicates that the following schedule of collections holds true:

Collections in Month of Sale	20%
Collections in Month Following Sale	70
Collections in Second Month Following Sale	9
Uncollectible Accounts	1
	100%

The accounts receivable balance as of December 31, 1957, is expected to consist of the following items:

Source	Accounts Receivable	Expected Uncollectibles
December Sales	$32,000	$ 400
November Sales	3,000	300
October Sales	1,000	1,000
September Sales	500	500
	$36,500	$2,200

Payments of cash are expected to be equal to the sum of:

Selling Expenses
Cost of Direct Material used
Direct-Labor Cost Incurred
Out-of-Pocket Overhead Costs

There is a cash balance of $100,000 on January 1, 1958.
No income tax payments are due in 1958.

Required: Prepare a statement of forecasted sources and applications of cash for 1958.

Part VI. Projected Financial Statements

The December 31, 1957, position statement is expected to include the following items:

Assets		*Equities*	
Cash	$100,000	Accounts Payable	$200,000
Accounts Receivable	36,500	Capital Stock	400,000
Allowance for Uncollectibles	(2,200)	Retained Earnings	154,300
Inventories	400,000		
Equipment	300,000		
Allowance for Depreciation	(80,000)		
	$754,300		$754,300

Required: Prepare a projected income statement for the year 1958 and a projected position statement (as of December 31, 1958). Assume that the income tax rate is 50% and that the taxable income (if any) is the same as the income per books.

Part VII. Budgets and Variances

Assume that certain price (wage) and usage (efficiency) variances can be forecasted. Which of the budgets will be affected by these items? Explain briefly.

Part VIII. Actual Costs of January

During January, 1958, the following events occurred:

Bats Produced		125,000
Cutters Worked 30,000 hr. and Earned		$ 75,000
Finishers Worked 62,000 hr. and Earned		250,000
Cost of Wood Used (260,000 lb.)		28,000
Fixed Overhead		
Equipment Depreciation	$ 2,000	
Salaries of Supervisors	15,000	
Building Rent	8,000	
Indirect Labor	4,500	
Indirect Supplies	2,500	
		32,000
Variable Overhead		
Indirect Labor	$ 9,000	
Power	2,000	
Indirect Supplies	5,000	
		16,000
Selling Expense		5,000

Required: (a) Compute the material price and usage variances; labor efficiency and wage rate variances; variable overhead budget and efficiency variances; and fixed overhead budget, efficiency, and idle capacity variances.

(b) Assuming that all the bats produced could be sold for $3 per bat, analyze the results of operations for January. What possible actions could be taken to improve the profit picture?

26

Control of Costs

ONE OF THE most important tasks of any cost accounting system is the control of costs. The control is actually accomplished in two ways. One is the psychological impact which the review of performance has upon the way managers will perform, and the other is the review of costs which enables management to correct deficiencies which would otherwise be unnoticed.

Psychological Impact. If the various levels of management know that their performance is being reviewed, they are more likely to be on the lookout for inefficiencies and to take steps to rectify these situations. The psychological impact is impossible of measurement, but it is possible that this is the most important contribution of a cost accounting-cost control system.

Review of Costs. It is common to speak of cost standards in relation to direct material and direct labor, and of budgeted costs when speaking of overhead and nonmanufacturing costs. Standard and budgeted costs are the backbone of any cost control system. They set the "par" or goal that management attempts to attain. The standard can be attained only by a high level of efficiency. If the actual costs are in excess of the standard costs, then management has not reached this high level of efficiency, and the unfavorable variance from standard costs must be explained.

Some companies follow the unwise practice of establishing standards only for direct material and direct labor and not controlling manufacturing overhead and nonmanufacturing costs. This is a procedure that can cost a firm a great deal of money. Overhead is just as important an item as direct costs and should be subjected to the same cost controls. One company, after installing a control system for overhead costs, found that a plant had recently purchased a 20-year supply of First Aid material; another plant was obviously supplying small tools for the do-it-yourself workshops of its workers.

Flexible Budgets. The flexible budget procedure for controlling costs compares the *actual* overhead to the *budgeted* overhead at the *same level* of operations. Comparing costs at the same level of activity is extremely important, since the reporting of the incurred cost has control significance only when compared with what the cost should have been at the same level of activity.

The flexible budget procedure implies a knowledge of how costs will be affected by changes in the level of operations. The nature of the cost (how it will react to changes in activity) can be determined in either of two ways:

1. By a study of how the cost should theoretically react to changes in activity (for example, wages of material handlers may be expected to be variable, since the more activity, the more material to be handled).
2. By a study of how the cost (or costs) has reacted to changes in activity (this problem is most simply solved by using a graphical solution).

The first of the two procedures is the preferred method. It eliminates the danger of using past experience as a guide in setting standards. When past experience is used, past inefficiencies are built into today's standards. The standards should reflect a high level of efficiency, not merely what has happened in the past.

However, past experience may be useful in showing the attainable level of efficiency. It may also uncover factors that influence costs but which have previously been ignored. For example, some costs may increase as the activity increases but may then show a reluctance to decrease when the level of operations slackens (for example, new foremen have to be hired for a second shift, but when the shift is disbanded, the foremen remain). Another method of uncovering inefficiencies is to compare the cost experience of different plants of similar characteristics. This often will uncover areas where important inefficiencies have been occurring. A company, in comparing the heat expense of its different plants, found that a Chicago plant had higher costs than its other plants. This was at first blamed on the Lake Michigan winds, but engineers disproved this explanation. Size of plant also did not account for the high heat bill. The answer was found in an open loading platform. The firm was literally attempting to heat all of Chicago.

Plotting Expenses. It is helpful to plot on the same graph the past experience of a cost for different levels of activity and a line representing the budgeted costs. When the actual cost is incurred, it can be plotted on this graph and compared with what it should be (the budgeted amount), and also compared with what it has been in the past for a comparable level of operations.

Example

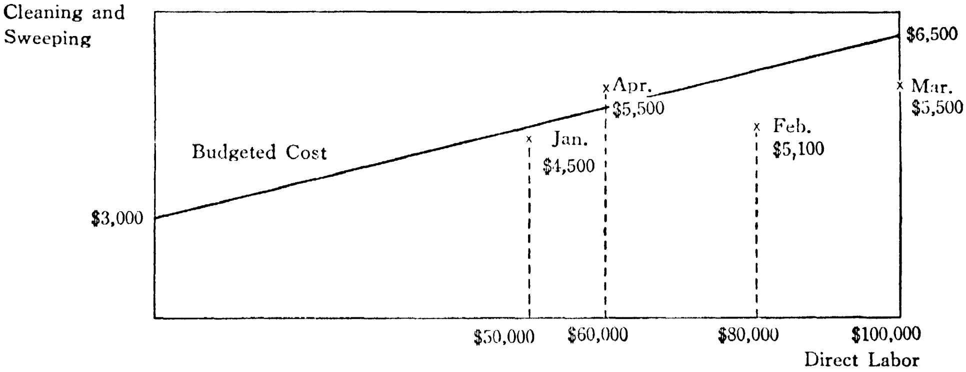
An analysis of laborers engaged in cleaning and sweeping indicated that the cost would be $3,000 at zero level of activity and would increase $3.50 for every $100 of direct labor.

The experience of the cost for the past three months is as follows:

	Cost	*Direct-Labor Dollars*
January	$4,500	$ 50,000
February	5,100	80,000
March	5,500	100,000

Plot the "budgeted cost" line and the points representing experience of the past three months.

The actual cleaning-labor cost for April is $5,500, and the direct-labor cost is $60,000. Plot this information, and give comments.



Comments

The expense for April is above the budgeted cost line. This indicates inefficiency. Recent past experience also led to the conclusion that the cost for April was too high. Since the cost for April is the same as for March, it may be that the extra cleaners hired for the peak operations in March were kept on the payroll in April.

Reports: Form, Frequency, and Timing. The reports used in controlling costs take various forms. There are direct-labor reports, material-usage reports, overhead-cost reports, etc. While different in detail (for example, labor reports also give hourly information), they have many similarities and can be expected to have all or some of the following columns:

Name and Account Number of the Cost
Actual Cost for the Period
Budgeted (standard) cost for the Period
Variance (difference between actual and standard cost)
Actual Cost (year to current date)
Budgeted Cost (year to current date)

This information is often recorded on "punched" cards, and the reports take the form of a "run" (automatically typed report) of the machine. The use of machines decreases the cost of each successive report and makes the reports more readily available. Management can get information that previously would have been too expensive to accumulate.

The frequency and nature of the reports vary from company to company. Many firms report labor costs *daily*. Some firms also report material and overhead daily, although this is relatively less common than daily reporting of labor. It is necessary to balance the cost of getting daily reports with the usefulness of getting information while it is still significant. The timing of reports is extremely important. A labor report in the hands of the plant manager 12 hours after the event has occurred is much more useful than the same labor report delivered 30 days later. Monthly cost reports may be better than none at all, but they are a poor substitute for daily or weekly reports that are placed in the hands of management fast enough so that the causes of the inefficiency can be corrected before they waste resources for a month. Explanations are also earlier and more significant if the person explaining inefficiencies is explaining something which has happened on the preceding day.

Establishing Responsibility. Two of the primary precepts of any cost control system are that definite responsibility for the costs must be established, and that a manager must be held responsible only for those costs which he can control. Both of these precepts have accounting implications.

Costs should be recorded and accumulated by areas of responsibility. These areas of responsibility may be entitled departments, burden centers, overhead centers, etc., but whatever the title, the goal is to accumulate costs so that the efficiency of the person responsible for the costs may be judged.

The precept that a manager cannot be held responsible for costs that he cannot control means that reports must be prepared with noncontrollable costs carefully labeled as such or left off the report entirely. In too many cases the attention of executives is focused on the size of costs over which no control is being exercised by the person whose efficiency is supposedly being measured.

The allocation of manufacturing overhead costs to operating departments and the absorption of the overhead costs to find unit costs of product often result in confusion when attention is shifted to the control of costs. The allocation of overhead does not assist in the control of costs. To control costs, it is necessary to focus attention at that point where the costs are incurred.

Thus, to control the cost of the accounting function, it is necessary to investigate the costs of the accounting department which were incurred in the accounting department and not to consider the size of the cost allocations from the building department, power department, personnel department, etc. The allocation of these costs is relevant, but not for the control of costs.

Cost Control and People. Costs are not controlled by the *issuance* of reports but by their *use* by members of management in making decisions that will result in costs being less than they would be if the data had not been accumulated and circulated. The importance of *people* in this process should not be overlooked. Only by the action of people in authority will costs be controlled.

The accounting department must take an active part in the education of management as to the importance of cost control and how accounting reports can help to accomplish this end. The job of the accounting department does not end with the preparation of a report. The person receiving the report should be helped to understand it and also to understand how it can be used to help him do his job more efficiently.

Control of Distribution and Administrative Costs. The focus of attention of this text is on the control of manufacturing costs. This is not meant to imply that the control of administrative costs and the costs of distribution is not important. The same types of procedures and reports used to control manufacturing costs should be used to control nonmanufacturing costs.

Several problems in the control of nonmanufacturing costs should be noted. Administrative costs and distribution costs are often less controllable than manufacturing costs. For instance, how can you measure with certainty whether the advertising expenditures are excessive, or that the president of the firm is traveling too much? Another problem may arise because it may not be possible to identify the administrative cost or selling cost with one product. If a salesman is selling four products, how much of his costs should be allocated to each product?

Thus, to some extent, the ability to control nonmanufacturing costs with accounting tools is limited by the nature of these costs. A large amount of the real control in this area is exercised by the executives who practice restraint in making expenditures because they have been indoctrinated in the importance of cost control in general. The accountant can report the actual expenditures made and can compare these expenditures with the budgeted amounts, but frequently this comparison will not reveal whether the expenditures have been wisely made. This will be shown in the long run by the income statements of successive periods.

QUESTIONS AND PROBLEMS

26–1. The Universal Corporation

The Universal Corporation uses a flexible budget procedure to control variable overhead costs. Each month the actual cost incurred is plotted, using direct-labor hours as a measure of activity. At the end of the year the points are correlated and a correlation line is plotted. The equation of the line is determined in order to obtain the fixed and variable components of the cost. This equation is used as the basis for the flexible budget for the next year.

Required

(a) Comment on the effectiveness of the procedure followed.

(b) How could the procedure be improved? Could the monthly plottings of cost be used for cost control purposes? Explain.

26–2. The Hall Corporation

The Hall Corporation has made an analysis of how the salaries of foremen should react to changes in activity.

	Foremen's Salaries
From Plant Shutdown to 20,000 Direct-Labor Hours per Month	$4,000 (monthly)
From 20,000 Direct-Labor Hours to 22,000 Direct-Labor Hours per Month	$4,000 + ($0.50 per direct-labor hours in excess of 20,000)
From 22,000 Direct-Labor Hours to 23,000 Direct-Labor Hours per Month	$5,000 (monthly rate)

There is a core of foremen who would be retained even if the plant were temporarily closed. If production required more than 20,000 hours of direct-labor hours per week but less than 22,000, then these foremen could handle the extra work by taking overtime. If the direct-labor hours increased above 22,000 hours, it is expected that a new foreman would be hired.

The actual costs for the first quarter were as follows:

	Direct-Labor Hours per Month	*Foremen's Salaries*
January	20,400	$4,800
February	22,400	5,600
March	19,600	4,900

Required

(a) Plot the budgeted costs and the actual costs for the first quarter.

(b) Comment on the level of foremen's salaries for each of the first three months.

26–3. The Small Automobile Company is very much concerned with the control of indirect labor. To help control this cost, the following report is prepared monthly:

PLANT ________ DEPARTMENT ________ MONTH ________

Code Number	Account Title	Budgeted for Month	Actual Exp. for Month	Variance	Budgeted for Year	Actual Exp. for Year

This report is expensive to prepare ($400,000 per year), and it has several weaknesses. The timing of the report is not good. It is distributed 20 working days after the end of the month. Some executives feel that by the time they receive the report, it is too late to take action.

Another difficulty has to do with sick leave and vacations. If the person who goes on sick leave or vacation is replaced by a temporary worker, this appears as a variance, since the wage cost of this extra worker has not been budgeted for the month. This annoys executives who have to explain why they had an unfavorable variance.

The Small Automobile Company has a procedure whereby the wage rates are strictly tied to the type of work being done. A higher grade of labor cannot be used for a job than that approved, without the personnel department's written permission. Changes in wage rates (increases in wages) are also strictly controlled, requiring the permission of the head of the department, the immediate supervisor, the personnel department, and the budget control officer.

Since wage rates are so well controlled, wages-rate variances only appear because of authorized wages-rate changes not yet incorporated into the budget figure. The significant variances in labor expense are caused by an excessive number of hours worked in proportion to the amount of direct-labor activity budgeted.

An analyst in the budget control group has suggested that the present report be replaced by a report that would compare the budgeted manpower with the actual manpower (a head-count basis). Overtime would be controlled by a separate but accompanying report. These reports could be distributed on the second working day following the end of the month.

Required: Assuming that you are controller of the Small Automobile Company, what action will you take?

26–4. A flexible budget is a budget that adjusts the indirect labor (and other variable overhead costs) to the actual level of activity. This is necessary if variable indirect costs are to be effectively controlled. Usually, direct-labor hours, direct-labor dollars, machine hours, or some other *one* basis is used to adjust all indirect costs. In recent years the weakness of this procedure has been noted. Many indirect costs will not vary directly with direct-labor hours. In the long run there may be a good correlation, but in the short run there may be leads and lags. For example, the receiving department may have to expand to receive raw material before the direct-labor force is expanded. The accounts receivable department may not have to expand although the direct-labor force has been expanded.

To secure better control of indirect labor, attempts have been made in recent years to obtain types of work measurement more immediately related to the work than direct labor. For example, the accounts payable labor cost is related to the number of invoices processed.

Required: Name several types of indirect labor and the measures of work that can help to control these indirect labor costs.

27

Control of Inventory

THE PROBLEM OF determining and controlling the level of inventory is one of the most important problems that management faces. There is danger that management may ignore the problem of inventory control and incur various unnecessary costs which accompany excessive inventories. Unfortunately, many of the costs arising from excessive inventories appear to be "normal"; thus the problem of controlling inventory costs is best solved by attacking the core of the problem, i.e., the size of inventory required.

Costs of Carrying Inventories. What are the costs of carrying goods in inventory? It should be recognized that these costs will be losses arising from inefficiency if the inventory on hand is excessive. Among the costs connected with the carrying of inventory are:

Storage Space Costs
Handling Costs
Property Taxes
Insurance
Interest on Capital Invested in Inventory
Risks of Spoilage and Obsolescence
Paper Work (including the costs of counting the excessive inventory)

It has been estimated that the annual costs of carrying inventory are approximately 25% of the cost of the inventory. The validity of this rule of thumb will, of course, depend on the characteristics of the items in inventory, but it does dramatize the cost of inefficiency in controlling inventory.

Costs of Insufficient Inventory. Inefficient inventory management is a two-edged sword. Not only are there costs of carrying excessive inventory, but there are also costs connected with not carrying sufficient inventory. These costs or losses sometimes are forgotten, but they are every bit as important as carrying excessive inventory. Some of these costs are:

1. Lost sales because the customer could not obtain the desired product.
2. Shipping costs connected with rush purchase orders of parts and material.

3. Disruption of production process resulting in labor inefficiencies, layoffs, hiring, training costs, and overtime costs to make up lost production.

Controlling Amount on Hand: Inventory Turnover. One method of preventing excessive inventories is periodically to check the inventory turnover of each type of raw material, supply, and finished good. The turnover is usually computed on a yearly basis; thus, if a turnover for a month is computed, it must be multiplied by 12 to place it on a yearly basis.

$$\text{Inventory turnover} = \frac{\text{usage (in dollars or units) for a year}}{\text{average inventory}}$$

$$\text{Inventory turnover} = \frac{\text{usage for a month}}{\text{average inventory}} \times 12$$

Generally speaking, a high turnover is better than a low turnover, but there are exceptions. A high turnover may be the result of a very small inventory which is losing sales, causing production interruptions, etc. Thus, while a high turnover of inventory is an indication that inventory is being properly controlled, it is only a small portion of the entire evidence of the efficiency of management.

Instead of expressing inventory turnover as "times per year," the number of times the inventory turns over may be divided into 365 days in order to find the period of time it takes for the inventory to turn over. Expressing the inventory turnover in terms of days may be of assistance in impressing upon management the fact that the inventory is excessive.

Controlling Amount on Hand: Number of Days' Supply on Hand. For each item in inventory a maximum amount of inventory should be stipulated. This can be determined by using the maximum possible usage (or most optimistic sales) per day and taking into consideration the minimum quantity desired, the time it takes to place an order, and the optimum order size. Once the maximum stock has been determined, then a report should be made out each month, indicating the number of days' supply on hand for each product. To compute the number of days' supply on hand, it is necessary to know the amount on hand and the projected usage in the coming months.

$$\text{Number of days' supply on hand} = \frac{\text{inventory on hand}}{\text{projected usage per day}}$$

If the number of days' supply on hand is in excess of the maximum stock allowable, an explanation should be sought for the cause of the variance.

Determining Order Size. In order to compute the maximum allowable inventory, it is necessary to know the optimum order size. This is not an easy problem to solve, for there are various variables that have to be taken into consideration. Some costs will argue in favor of many small orders, and other costs will argue in favor of a few large orders. Thus, the total investment may be less if small orders are placed, but the cost of paper work will be increased. There are also quantity discounts that have to be taken into consideration. The factors relating to the problem of optimum order size are:

Expenses tending to increase with an increase in order size

- Investment Cost (interest)
- Storage Space Costs
- Insurance, Taxes (larger inventories on hand)
- Risks of Spoilage and Obsolescence

Expenses tending to decrease with an increase in order size

- Cost of Paper Work (purchasing, receiving, paying bills)
- Cost of Product (quantity discounts)

If these costs can be predicted, one method of solution is to plot on a graph the various costs for different order sizes. The average cost per unit of product should be plotted on the *Y* axis against the order size on the *X* axis. In addition, an average cost curve for all costs should be plotted (the sum of the various average cost curves). The point where the average cost curve for all costs reaches a minimum is the best order size. The problem can also be solved by adding the several costs and finding the order size where the average cost per unit reaches a minimum.

Example

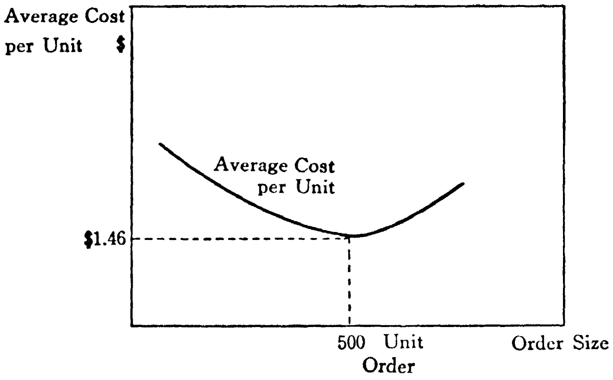
From the following information compute the optimum order size:

Size of Order, Units	Invoice Cost per Unit	Cost of Paper Work per Unit	All Other Costs (investment cost, etc.), per Unit
50	$1.00	$0.10	$0.50
100	0.95	0.05	0.51
500	0.85	0.01	0.60
1000	0.70	0.005	0.80

Solution

Size of Order	Average Cost per Unit (all costs)
50	$1.60
100	1.51
500	1.46
1000	1.505

The optimum order size seems to be 500 units per order. In order to solve this problem with more certainty, we need to know the invoice cost per unit for other sizes of orders.



Determining the Minimum Inventory Limit. Because of the various costs connected with having insufficient inventory on hand, management should establish minimum stocks as well as maximum allowable stocks. The minimum stock should be equal to the product of the number of days' supply which is desired to hold as a buffer stock, times the maximum possible usage per day.

Example

Compute the *minimum* inventory if it is desired to have on hand at least a 10-day supply. The maximum usage is 20 units a day, and the average usage is 15 units per day.

Solution: Minimum inventory = 10 × 20 = 200 units.

Determining the Order Point. The methods used to determine the optimum order size and the minimum inventory have been illustrated. The next step is to determine the *order point.* When is an additional order for the material (or part or product) submitted? To determine this, we must know the ordering time. Assume that:

It takes eight days to fill an order.
The optimum size of the order is 500 units (see preceding solution).
The minimum inventory is 200 units (see preceding solution).
The maximum usage is 20 units a day.
The average usage is 15 units a day.

If it takes 8 days to fill an order, then the maximum usage during that period will be 8 × 20 = 160 units. This is obtained by multiplying the number of days of order time by the maximum usage per day. The minimum inventory that we desire to maintain is 200 units. Thus, if we order 500 units when the inventory reaches a point of *360 units* (160 plus 200), we shall receive the 500 units when the inventory is no less than 200 units and most probably when it is 240 units (360 minus the average usage 15 units times 8 days). Thus, the order point is 360 units.

It is possible to encounter a situation where the optimum order was *less* than the average or maximum usage during the ordering period. In this case the firm will have to submit a second order before the first order's materials are received. An alternative procedure would be to order more than the so-called optimum order in order to ensure that enough goods would be on hand at all times.

Determining Maximum Stock (continuing the above example). What is the maximum possible inventory likely to be encountered, assuming the facts to be as given?

If 500 units are ordered when the inventory reaches a point of 360 units (the order point), and if no further units are used, there will be 860 units (500 plus 360) on hand when the order of 500 units is received. Thus, the absolutely maximum inventory you can expect to find on hand is 860 units, and this only in rare circumstances. If average usage of 15 units a day were used, there would be 740 units (860 minus 120) on hand after the receipt of the order. For managerial purposes this could be considered the "normal" maximum, although it should be remembered that 860 units will be found if the usage from time of ordering to time of receipt is zero.

Other Aspects of Inventory Control. The foregoing discussion has concentrated on controlling the amount of inventory on hand. There are other problems connected with inventory control. It is important, for example, that proper inventory records be kept of the dollar amounts as well as the physical units. The procedures for receiving and requisitioning inventory items should be well thought out and controlled. Storage facilities should be adequate so as to minimize loss from spoilage and from possible theft. Methods of storing and moving material should be reviewed to ensure a high level of efficiency in those areas.

Problems of inventory control have many facets, but reasonable solutions to these problems promise rewards worthy of the effort to find the solution.

QUESTIONS AND PROBLEMS

27–1. The Quincy Company

The following information is made available for the first quarter of 1957:

	Forecasted Sales	Sales, Actual	Manufacturing Cost of Sales	Opening Inventory Finished Goods	Opening Inventory Raw Material
January . . .	$10,000	$10,000	$ 8,000	$ 8,000	$ 9,000
February . .	12,000	14,000	11,200	12,000	15,000
March	16,000	12,000	9,600	20,000	12,000
April	16,000	——	——	15,000	10,000

The work-in-process inventory is constant each period. The manufacturing cost of sales is a standard cost figure. Material is 80% of the total manufacturing costs. The material usage and price variances have not been significant.

It is a policy of the firm to maintain a month's supply of finished goods on hand. A 45-day supply of raw material is the optimum inventory (projected usage of raw material should take into consideration changes in finished goods inventory).

Required: Prepare an analysis that will assist management in forming an opinion as to the efficiency of production planning and inventory control during January, February, and March. Use the actual number of days for each month.

27–2. The Queen Company

The Queen Company is attempting to determine the optimum order size for ordering a type of steel plate. The steel may be ordered by using three different size orders.

Size of Order	*Total Invoice Cost*
5 tons	$ 5,000
100 tons	80,000
200 tons	150,000

Other costs connected with ordering and storing inventory are:

Cost of Paperwork	$4 per order
Handling Costs	$1 per order plus $8 per ton
Property Taxes	$30 per ton of average inventory
Insurance	$10 per ton of average inventory
Interest on Capital Invested (use invoice cost and average inventory)	20%
Risks of Spoilage	$20 per ton of average inventory
Storage Costs	$1,000 (This covers the rent on a storehouse which will store 120 tons.) $10 per ton for additional storage space (the cost is determined by maximum possible demand for space).

Inventories for each of the three order sizes (in tons) would be:

Size of Order	*Average Inventory*	*Maximum Inventory*
5	7.5	10
100	52.5	105
200	102.5	220

Required: Determine the optimum order size. Present a schedule of the costs for the different order sizes. Assume that the firm expects to use 300 tons of this material in the next year.

27–3. The Quill Company

The Quill Company is setting up an inventory ordering system. For one type of material the following information is obtained:

It is desired to have on hand at least a 10-day supply at all times.
Maximum usage per day is 40 units.
Normal usage per day is 15 units.
It takes 5 days to fill an order.
The optimum size of an order is 500 units.

Required

(a) Compute the minimum inventory.
(b) Determine the order point.
(c) Determine the "absolute" maximum allowable inventory.
(d) Determine the "normal" maximum allowable inventory.

27–4. Complete the following table:

	January	*February*	*March*
Projected Finished Goods, Beginning Inventory (in tons)	1,000	1,200	1,600
Projected Finished Goods, Ending Inventory (in tons)	1,200	1,600	1,400
Forecasted Units of Sales	3,300	2,800	3,100
Inventory Turnover (annual basis)			
Number of Days Inventory on Hand at the Beginning of the Month			

Use the following number of days: January 31, February 28, and March 31.

27–5. Given the following information, determine the optimum order size:

The company uses 450 units a year. The costs, which vary with inventory, have been obtained by multiplying the anticipated cost per year, per unit of inventory, by the average or maximum inventory for each order size, and dividing that amount by the number of orders to be made during the year.

SCHEDULE OF COSTS ON A PER ORDER BASIS

	Order Size 50 Units	 90 Units	 450 Units
Invoice Cost	$250	$360	$1,710
Costs that Vary with Number of Orders	27	15	3
Costs that Vary with Average Inventory	63	100	412
Costs that Vary with Maximum Inventory	15	20	35
Cost per Order	$355	$495	$2,160

27–6. The Quint Company

Part I. Compute the projected number of days supply of raw material on hand for each of the first three months of the year.

	Projected Usage per Day, Tons	*Projected Beginning Inventory, Tons*
January	5	150
February	6	150
March	8	160

Part II. Compute the projected usage per day for each of the first three months of the year.

	Projected Usage for Month, Tons	*Number of Days in Month*
January	155	31
February	168	28
March	248	31

Part III. Compute the projected usage of raw material for each of the first three months.

	Raw Material in Cost of Sales, Tons	*Raw Material in the Increase in Finished Goods, Tons*
January	100	55
February	120	48
March	260	(12)

Part IV. The cost of the raw material in the end product is equal to 50% of the sales price and 80% of the costs of the finished goods. Compute the cost and the tons of raw material used during the month of January. There is no loss or gain in weight during the production process.

Actual Sales (price $160 per ton)	$14,400	90 tons
Actual Beginning Finished Goods Inventory ...	11,000	110
Actual Ending Finished Goods Inventory	16,500	165

27–7. Compute:

(a) Inventory turnovers for finished goods for each of the first three months of the year.

(b) The period of time (number of days) it takes for the finished goods inventory to turn over.

	Beginning Finished Goods Inventory, Tons	*Sales, Tons*
January	1,000	4,400
February	1,200	3,500
March	1,600	5,250
April	1,400	

27–8. The Queen B Company follows a policy of ordering raw material based on an analysis of the optimum order size. The following analysis was prepared for one particular raw material:

Size of Order, Units	*Cost per Order*	*Units per Order*	*Average Cost per Ton per Order*
50	$ 280	50	$5.60
90	495	90	5.50
450	2,250	450	5.00
900	4,590	900	5.10

The Queen B Company uses 1,800 units of this raw material a year. The following list is a sample computation of cost per order (order size 450 units):

Invoice Cost	$1,800
Cost of Paperwork, Handling Costs (which vary with number or orders)	15
Cost of Insurance, Taxes, Interest, etc. (which vary with average inventory) *	400
Cost of Storage (varies with maximum inventory)	35
	$2,250

* The average inventory of 500 units is multiplied by the anticipated cost per year of one unit of inventory, $0.80 per unit.

Required: Comment on the procedure followed by the Queen B Company.

28

Variable Costing, or "Direct Costing"

THE "DIRECT COSTING" procedure has received much attention in business literature. Unfortunately some confusion has arisen because the procedure under discussion is not concerned with the treatment of direct and indirect costs but with the treatment of fixed and variable costs. Thus this chapter will discard the term *direct costing* in favor of the more descriptive and accurate title *variable costing.*

Definition of Variable Costing. There are many possible ways in which costs may be classified and channeled through the accounts. The problem at hand is to determine which costs of a manufacturing firm are inventoriable. Following conventional treatment, the criterion is whether or not the cost is connected with the manufacturing process. Following the variable costing procedure, costs must be further classified as to whether they are fixed or variable.

The question of what costs are to be inventoried, and what costs are to be written off as expenses against the period's revenues, is important not only for general financial statement purposes but also for statements being used for managerial purposes. It is usually argued that if the service that caused the incurrence of the cost is directly or indirectly connected with the manufacturing process, then the cost of the product being made should include some fraction of the cost of this service. Identified by this criterion, the following costs are indicative of those items that would be considered inventoriable: direct labor, material, cleaning supplies, factory depreciation, and a fraction of the president's salary. Note that some of these costs are fixed and some are variable. Some require cash disbursements during the period; some do not. One thing they have in common is that they are treated as inventoriable, according to conventional treatment.

Variable costing uses the foregoing criterion but it also makes use of another. A cost is considered inventoriable if it is *variable* and connected with the manufacturing process. The *exclusion of fixed costs* from the inventoriable classification is primarily justified because of the usefulness of the income figure, computed by using this procedure, compared with the usefulness of the other alternative procedures. For managerial purposes the income computed under a variable costing procedure is more useful than the income computed under a procedure that attempts also to absorb the fixed costs to product.

Using the variable costing procedure, a cost is inventoriable if it is (1) connected with the manufacturing process, and (2) if it is of a variable nature. A variable cost is a cost that will vary directly with production. If production doubles, the cost will also double. A fixed cost is a cost that is constant over wide ranges of production. Included in this classification are building depreciation, the president's salary, and the costs of many of the service departments. Some costs will not fit snugly into one of the two classifications mentioned. For most cases the cost may be "squeezed" into one of the classifications; if it cannot, then it should be classified as a semi-variable cost and should be treated as an inventoriable cost. The assumption is that the cost was incurred because the product was produced. If production had been decreased, the cost would have decreased, although not necessarily in a proportionate amount.

The Problem. The need for variable costing arises because of the following dilemma: If the fixed costs are $1,000 and 1 unit is produced, what are the fixed costs per unit? The obvious answer is $1,000. If, instead of 1 unit, there are 1,000 units produced, the fixed cost per unit becomes $1. If the sale price is $5 per unit, the following situation may well develop: Plant A *produces and sells 1 unit.* Plant B *produces 1,000 units and sells 1 unit.* The two income statements appear as follows:

	Plant A	*Plant B*
Sales	$ 5	$5
Less Cost of Product	1,000	1
Income (loss)	($ 995)	$4

Each plant sold only 1 unit for the same price of $5 per unit. Each plant has the same fixed cost of $1,000 (the variable cost is assumed to be zero in order to keep the illustration simple). Despite these facts, one plant shows a loss of $995 and the other plant shows a profit of $4. The reason for this unlikely situation is that in the case of Plant B, its inventory now contains 999 units of product valued at $1 per unit. Should the manager of Plant B be praised for his "efficiency" and the manager of Plant A be fired because of his bad showing? The manager of Plant B may actually be more inefficient, since he is building up an inventory that may well be too high!

Two Solutions. The accounting profession recognized this difficulty in measuring performance and came up with a procedure that helped solve the problem somewhat by eliminating the changes in the costs per unit when there are fluctuations in the level of production. Let us assume that the capacity of each plant is 1,000 units of product. The fixed cost per unit of both plants will then be the total fixed costs divided by the units that could be produced at capacity. In the situation being discussed, the fixed cost is $1,000; thus the fixed cost per unit is $1. Therefore, if Plant A produces 1 unit, the fixed cost per unit is $1; if it produces 500 units, the fixed cost per unit is $1; and if it produces 1,000 units, the fixed cost per unit is still $1; but there are differences in the "underabsorbed" fixed costs. Thus, if 1 unit is produced, there is an underabsorbed fixed cost of $999. If 500 units are produced, there is an underabsorbed fixed cost of $500; and if 1,000 units are produced, there are no underabsorbed fixed costs. Following this procedure, the income statements of the two plants, A and B, would appear as follows:

	Plant A		*Plant B*	
Sales		$ 5		$5
Less:				
Cost of Product	$ 1		$1	
Underabsorbed Fixed Cost	999	1,000	-0-	$1
Income (loss)		($ 995)		$4

Plant B again shows an income of $4, since it has again avoided the charge of $999 by having it lodge in inventory. These two income statements would be perfectly adequate if the reader were capable of judging the significance of the charge for "Underabsorbed Fixed Cost." Unfortunately there is a tendency to ignore all information except the so-called key figure, the income for the period. This failing frequently makes it desirable for the accountant to revise the income statement and place it on a variable costing basis. The income statements would then appear as follows:

	Plant A	*Plant B*
Sales	$ 5	$ 5
Less:		
Variable Cost (zero in this illustration)	-0-	-0-
Fixed Cost of Period	1,000	1,000
Income (loss)	($ 995)	($ 995)

At last the incomes of the two plants are equal. Each plant had sales of $5 which resulted in equal profits. There is no confusion arising from the absorption of fixed costs into inventory. The relative performance of the two plants is made to depend on the sales and efficiency of the plants and not on the amount of goods produced for inventory. This is more meaningful than a situation where a plant or division can better its income position by merely increasing production.

The preceding illustration will be made more realistic by the addition of some variable costs. Assume that the variable costs per unit are $2 per unit. It is useful to strike a subtotal, indicating the excess of revenues over variable costs. For many managerial decisions this is a very significant figure.

	Plant A	*Plant B*
Sales	$ 5	$ 5
Less Variable Costs of Product Sold	2	2
Excess of Revenues over Variable Costs	$ 3	$ 3
Less Fixed Costs	1,000	1,000
Income (loss)	($ 997)	($ 997)

Financial Reports. The reports discussed in the preceding section are significant for managerial purposes. It must be decided whether it would serve any purpose to use the variable costing procedure for general financial statement purposes. The fixed manufacturing costs are conventionally considered to be a cost of product and the value of the inventory reflects this fact. If only variable costs are placed into inventory, the effect will be an understatement of inventory. One solution is to issue different reports to management and to other users of financial reports.

Assume that variable costing is used for financial reporting purposes. During the year in which variable costing is inaugurated, the income for the period will be lower than it would be if the shift had not been made to variable costing. This results from the fact that all the fixed costs are being charged to expense during the period and none are being charged to inventory. In the subsequent years the income for each period will be approximately equal to what it would have been if variable costing were not used. While all the fixed costs are being charged against revenues, this is compensated for by the fact that the beginning inventory, also charged to expense, has no fixed costs in it. Unless there is a considerable fluctuation in inventory, the above will hold true. Variable costing does have a LIFO effect which may be detected if attention is focused on fixed costs. With variable costing the fixed costs of this period are charged against the revenues of this period. If variable costing is not used, some of these fixed costs will not be charged against revenues until the next period, and some of the fixed costs in this period's expenses will come from the last period. This LIFO effect is not too significant, since a large percentage of the fixed costs are not subject to wide and sudden fluctuations in price, and also because only a small percentage of the period's production usually ends up in inventory.

Summary. Variable costing is a procedure wherein only the variable costs are charged to inventory. The fixed costs are considered a cost of the period and are charged to expense. This procedure is commonly known by the somewhat confusing title of "direct costing" (confusing because the question of direct costs does not enter into the discussion).

The procedure is especially useful in eliminating the income distortion caused by producing for inventories rather than sales. It is also useful in supplying information for managerial decisions that require a distinction between fixed and variable costs.

The variable costing technique is not conventionally carried over to the financial statements made available to the public. Fixed costs are considered a cost of product and are included in inventory. The two conflicting points of view may be reconciled by separate reports for management and the public.

Some proponents of variable costing have stated that incomes of successive periods will be distorted by changes in finished goods inventory if absorption costing is used, i.e., a method in which the cost of product includes a pro rata share of fixed costs. This is not a valid criticism of absorption costing because it will give results equally as good as variable costing (using this one criterion) if the idle capacity variance is not allowed to affect the income figure being analyzed. If this is done the measure of operating efficiency will not be affected by changes in inventory, since the cost of product will be determined by using a set overhead rate. The idle capacity variance, which is affected by changes in the level of production, is excluded from the computation.

While absorption costing may be used to eliminate the effect on income of changes in inventory, one problem remains. If the idle capacity variance is excluded from the measurement of income, the income of the period will be overstated (if the industry has seasonal characteristics, the idle capacity variance may reflect a loss arising from idleness or merely the seasonal slack).

Direct costing solves the problem of distortion of income of successive periods caused by fluctuations in inventory. It does this by including all fixed costs as costs of the period. Absorption costing may solve the same problem by excluding certain costs (the idle capacity variance) from the measurement of income. Direct costing results in understated inventories; absorption costing may result in overstated incomes if all idle capacity variances are excluded from the measurement of the income of a period. For managerial purposes it seems that variable costing will be the more useful in situations where production and finished goods inventories are likely to fluctuate.

QUESTIONS AND PROBLEMS

28–1. The United States Can Company

The can industry is an industry in which there are wide fluctuations in production and sales due to the seasonal nature of the products being canned. The United States Can Company has two plants, one in San Francisco and one in New York. The physical characteristics of the plants are similar, and the results of operations of the two plants are compared each month in order to judge the performance of the two managements. The March income statements of the two plants were as follows:

	San Francisco Plant	*New York Plant*
Sales	$1,000,000	$1,000,000
Less:		
Manufacturing Cost of Sales	$ 700,000	$ 800,000
Selling and Administrative Expenses	200,000	200,000
Total Expenses	$ 900,000	$1,000,000
Net Income	$ 100,000	——

Each plant sells their product for the same price. During the month of March both plants sold and shipped 20,000,000 cans. The production for the month at the two plants was as follows:

	San Francisco Plant	*New York Plant*
Opening Inventory (number of cans)	50,000	50,000
Production During the Month	30,000,000	20,000,000
	30,050,000	20,050,000
Cans shipped during month	20,000,000	20,000,000
Ending Inventory	10,050,000	50,000

The San Francisco plant built up its inventory in March in anticipation of the canning season, which begins in April on the west coast. The east coast canning season begins in the middle of May.

The standard cost card for the type of can sold in March discloses the following information:

STANDARD COST CARD
(for both plants)
CAN NO. 4593

	Cost per 1,000 Cans
Direct Material	$20
Direct Labor	4
Overhead	
Variable	1
Fixed	10
	$35

For both plants the manufacturing fixed costs budgeted for the month were $300,000. There were no spending (expense) or efficiency variances.

All selling and administrative expenses were of a fixed nature.

Required: Write a report relative to the operations of the two plants during the month of March. Explain the differences in income and prepare a revised statement which would be more useful in appraising the results of the operations of the two plants.

28–2. The New York Plant: The United States Can Company

For several months top management has been puzzled by fluctuations in the income reported by the New York plant. The results for February, March, and April were as follows:

	February	*March*	*April*
Sales	$1,000,000	$1,000,000	$500,000
Less Manufacturing Cost of Sales	$1,000,000	$ 800,000	$250,000
Selling and Administrative Expenses	200,000	200,000	200,000
Total Expenses	$1,200,000	$1,000,000	$450,000
Net Income (Loss)	$ (200,000)	$ 0	$ 50,000

There has been no change in sales price during the three-month period. During the months of February and March, the plant sold and shipped 20,000,000 cans. In April it shipped one-half that total. The production for the three months was as follows:

	February	*March*	*April*
Opening Inventory	20,050,000	50,000	50,000
Production during Month	———	20,000,000	40,000,000
	20,050,000	20,050,000	40,050,000
Cans Shipped during Month	20,000,000	20,000,000	10,000,000
Ending Inventory	50,000	50,000	30,050,000

The standard cost card for the type of can sold discloses the following information:

	Cost per 1,000 Cans
Direct Material	$20
Direct Labor	4
Overhead	
Variable	1
Fixed	10
	$35

The fixed manufacturing costs budgeted for each of the months were $300,000. There were no spending (expense) or efficiency variances during the three months.

All selling and administrative expenses were of a fixed nature.

Required: Present comparative income statements for the three months which would be most useful in appraising the results of operations for the three months.

28–3. The Can Company of New York has decided to use a variable costing procedure for internal accounting reports. Following this procedure, all fixed costs will be considered a cost of the period, and only variable costs will be inventoried.

The results of June's operations for the Ithaca plant were as follows:

Manufacturing Costs Incurred	
Variable Manufacturing Costs	$500,000
Fixed Manufacturing Costs	$250,000
Selling Costs Incurred	
Variable Selling Costs	$50,000
Fixed Selling Costs	$80,000
Administrative Costs Incurred	
Fixed Administrative Costs	$100,000
Number of Cans Produced	25,000,000
Number of Cans Sold	24,000,000
Revenues from Sales	$1,000,000

Required: (a) Prepare two income statements, one following conventional overhead absorption accounting techniques, the other using variable (direct) costing. Assume that there was no beginning inventory of finished goods and that the *fixed* overhead absorption rate is $10 per 1,000 cans. Except for fixed overhead, actual costs are used in determining the cost of product.

(b) Prepare two additional income statements, one assuming that the fixed overhead absorption rate is $5 per 1,000 cans, and the company *does not* close out the idle capacity variance monthly; the other assuming that the plant uses normal activity of 20,000,000 cans as the basis for computing the fixed overhead rate; an absorption rate of $12.50 per 1,000 cans, and the company *does* close the variance account monthly to cost of goods sold.

(c) Is it possible to use absorption costing and still retain the benefits of variable costing? Explain.

28–4. Some accountants state that fixed costs should not be considered a cost of product (should not be inventoried), since these costs will be incurred regardless of production or sale. These items should be treated as period expenses.

Required: Name several costs that can be considered as fixed costs and which would *not* be incurred unless there was *intent* of producing the product.

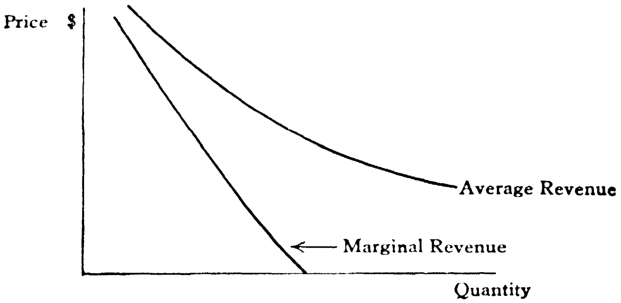
29

Marginal and Differential Costs, and Decision-making

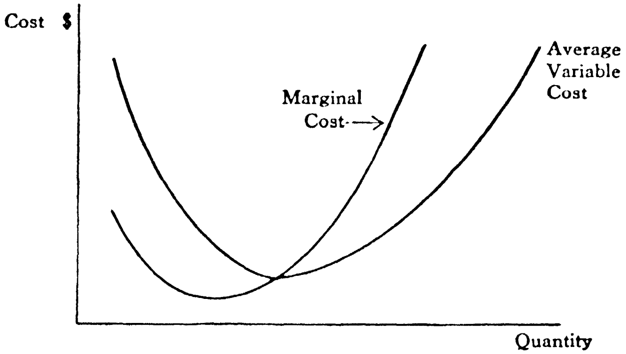
TWO OF THE most important decisions that businessmen must make are the pricing decision and the decision as to level of output. How are these decisions made? This question has never been answered satisfactorily. Economists have evolved a theory of the firm which is based on marginal analysis and which shows how the businessman should make these decisions. It is not important whether this type of analysis is being used in a majority or minority of cases, or whether it is not practicable in many situations. What is important is that essentially the marginal analysis is common sense, and therefore the method should be understood in its simplest form by all students of business. The basic principles are valid, whether or not they are actually applied in their pure theoretical form. Instead of marginal analysis the businessman will frequently think in terms of differential revenue and costs, this often being the closest that the accounting records can come to marginal costs.

Marginal Analysis: The Economic Approach. The economist states that a firm should produce where marginal costs equal marginal revenues and that at this point the firm will maximize its income. As long as the revenue from the next unit (the marginal revenue) is greater than the costs of producing that unit (the marginal costs), the firm should produce that unit. The firm should cease expanding production when marginal costs equal marginal revenues. The logic of this conclusion becomes evident if the graphical presentation is studied.

It is assumed that the lower the price of the product, the more units of product will be sold. Thus the average revenue curve slopes downward to the right (this is also the price curve). The marginal revenue curve slopes downward to the right also and is below the average revenue curve. The revenue added by the sale of an additional unit is less than the price, since the price of all previous units had to be lowered to make the additional sale.



The average variable cost curve slopes downward to the right, reflecting increasing efficiency, and then curves upward, reflecting and passing the point of maximum efficiency. The marginal cost curve passes through the average variable cost curve at its minimum point and then "pulls" it up.



The next step is to combine the two graphs. From this new graph may be picked off the optimum level of production (*0A*), this being where the marginal costs equal marginal revenues.[1] The price to be charged for the product (*0P*) may be obtained by finding the average revenue (price) necessary to sell *0A* units of product. It is extremely important to recognize that the price charged is *not* the marginal revenue (*0M*). The intersection of the marginal revenue and marginal cost curves determines the *output,* but the price is determined by the average revenue curve.

In the following graph the average revenues are greater than the average variable costs at the optimum level of output. Thus it is possible that the firm is profitable. To know for certain, it will be necessary to draw in the "Average Total Cost" curve. The location of this curve will determine whether the firm is profitable.

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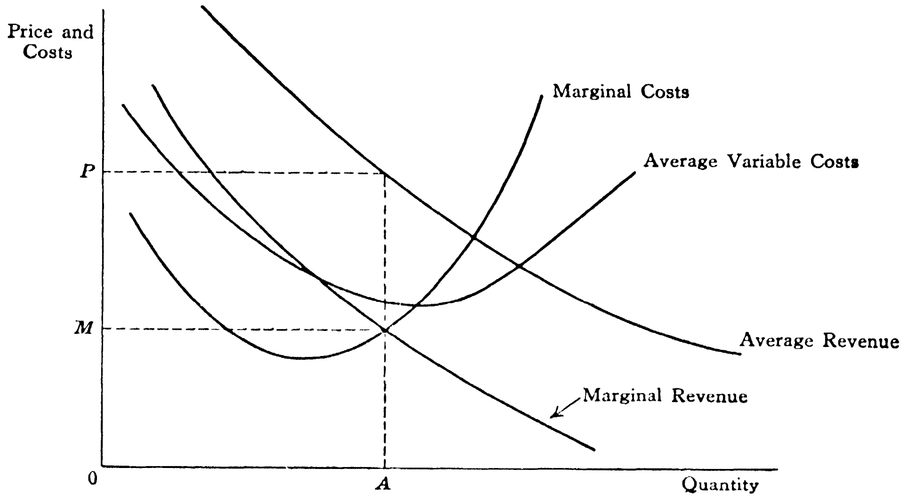
[1] The firm will not produce in excess of *0A* units, since the costs of each additional unit are in excess of the revenues of those units.

This discussion is by no means the complete story of marginal analysis. Among the questions ignored is the question of the degree of competition.



Is the average revenue line for the firm a horizontal straight line, and if it is not, what is the slope? What is the shape of the average variable cost curve? What conditions are necessary for a condition of equilibrium? Most important, does the individual businessman know the shape of all or any of these curves? The marginal cost curve is not readily available from the accounting records. This is not merely an oversight on the part of the accountant. The accountant appreciates the importance of marginal costs, but he also recognizes the expense of accumulating information when the change in costs is caused by adding or dropping *one unit* in production. Instead, the accountant compromises and uses a technique that makes use of *differential costs.*

Differential Costs: The Accounting Approach. The economic approach concerned itself with the increase in revenues and expenses arising from the additional sale of *one unit.* The accounting approach concerns itself with the increase in revenues and expenses arising from the additional sale of a *block of units.* For instance, what will be the effect of a sale of 1,000 units at a price of $5 a unit? To answer this question, the total costs without the sale must be compared with the total costs with the sale made. The difference is the "differential cost" of making the sale. If the revenues ($5,000) are greater than the differential costs, then the sale will increase total profits. Differential costs will also be equal to the variable costs per unit times the number of units *plus* any "fixed costs" that will be added because of the additional production.

The differential cost analysis is particularly valuable in making a decision as to the desirability of "bidding" for additional business. If the revenues obtained from these sales are greater than the differential costs, then the firm will be better off gaining the business.

Example

The ABC Company has an opportunity to bid for the right to sell 1,000 containers to the government. A study reveals the following information:

Direct Material Costs per Container	$2.50
Direct Labor Costs per Container	1.25 (1 hr. of direct labor)

The Company has the following overhead rates:

Fixed Costs	$2.25 per direct-labor hour
Variable Costs	1.50 per direct-labor hour

In addition the company will have to buy special equipment costing $500. This equipment will have no foreseeable use after this contract.

Required: Compute the *minimum revenue* the company must obtain in order for it to be no worse off than if it did not get the order. Assume the company has excess capacity.

Solution

Direct Material	$2.50 × 1,000 =	$2,500
Direct Labor	1.25 × 1,000 =	1,250
Variable Overhead	1.50 × 1,000 =	1,500
Cost of Additional Equipment	0.50 × 1,000 =	500
Differential Costs per Unit (not the marginal costs)[2]	$5.75	
(Differential Costs of the Sale of 1,000 Units)		$5,750

If revenues of $5,750 are obtained for the 1,000 containers, the firm will be no worse off than if it did not have the order, since the differential costs are equal to the additional revenues. Actually the firm would bid something higher than $5.75 per unit in order to better its position by the transaction. However, the maximum price bid will be tempered by the fear of losing the bid and possibly by non-economic motives (such as patriotism).

Accounting Data and Decision-making. The problems and reading material in accounting textbooks generally imply that decisions can be made by using only accounting data. Accounting information can help in making decisions, but it does not replace judgment. The business manager must look beyond the accounting analysis to be able to choose the best course of action.

Accounting information generally incorporates estimates and forecasts. This is especially true in pricing decisions. The costs for different levels of production must be predicted as well as the levels of sale for different unit prices. But even if the forecasts and estimates are absolutely correct, there are other considerations that must be reviewed. What will be the effect of a price rise on customer goodwill? What will be the long run impact of a price change? How will a price change affect the company's labor relations? Are there any legal implications? These factors and others must be considered before a decision can be made intelligently.

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[2] The marginal cost of the first unit is $505.25. This strange answer arises because of the discontinuity of the costs. The first unit bears the total cost of the equipment.

QUESTIONS AND PROBLEMS

29–1. The J.B. Clark Company

Required

(a) Assuming the following information, determine the total revenue and marginal revenue amounts for the different possible prices. At what price would the company maximize revenues?

Units Sold	*Price Necessary to Sell the Number of Units Indicated in Column 1*
1	$10
2	9
3	8
4	7
5	5
6	4
7	3

(b) Can you determine the optimum price or the optimum level of production from the given information? Explain.

29–2. The J.B. Clark Company (continued)

Assume that the company has fixed costs of $5 and variable costs for the different levels of production as follows:

Units Produced	*Total Variable Costs*
1	$ 8
2	15
3	21
4	26
5	32
6	40
7	50

Required

(a) Compute the marginal cost for each level of production.

(b) Plot the various curves necessary to determine the optimum level of output. What is the price at that level of output?

(c) Will the price equal marginal cost at the optimum level of output? Explain.

(d) Will the firm make a profit at the optimum level of output? Of what significance were fixed costs in determining the optimum level of output and price?

29–3. The Marshall Company

The Marshall Company is about to bid for a government contract. The president of the firm desires to know the minimum bid which the company can make in order for the firm to be no worse off than if the firm did not get the order. Assume that the firm has adequate capacity to produce the product for the government without adding to plant. The contract will be for 10,000 units.

The analyst prepared the following report:

	Per Unit	*Total*
Direct-Material Costs	$ 1.30	$ 13,000
Direct-Labor Costs	4.60	46,000
Overtime Incurred because of Contract	.10	1,000
Overhead		
Variable Overhead	1.00	10,000
Fixed Overhead	2.00	20,000
Special Equipment (to be purchased)	4.00	40,000
Allocation of Selling and Administrative Expenses (Fixed Costs)	3.00	30,000
Safety Factor (100% of the overhead rate)	3.00	30,000
Minimum Price	$19.00	$190,000

Required: Prepare a supplemental report for the president.

29–4. The Make-or-Buy Company

This company uses machine tools which it has been manufacturing for its own use. The company currently has excess capacity, and the tools are being manufactured in a part of the plant that would otherwise lie idle.

A salesman of machine tools, who has been attempting to sell to The Make-or-Buy Company, has prepared the following analysis in cooperation with company personnel:

	Cost of Manufacturing the Next Year's Supply of Tools	*Cost of Buying the Next Year's Supply of Tools*
Cost of Purchasing Tools		$210,000
Cost of Parts and Material	$100,000	
Labor (especially hired for this type of work)	40,000	
Labor (distribution of labor costs of regular hourly workers based on hours of actual labor)	30,000	
Labor (allocation of labor costs of salaried employees)	20,000	
Variable Overhead	10,000	
Fixed Overhead (includes $20,000 of depreciation of equipment especially purchased for this purpose in the past)	40,000	
	$240,000	$210,000

The purchased machine tools will have no operating advantage over the tools made by the plant itself.

Required: Prepare an analysis showing whether The Make-or-Buy Company should purchase or make its machine tools to fill its needs.

29–5. The presidents of two corporations were discussing their businesses. The conversation consisted of the following:

MR. FIX: My problem is having too low a volume of sales. I have fixed costs of $100,000 and variable costs of $1 per unit of product. With my present volume of 10,000 units, the average cost of product is $11 per unit. If I could sell 100,000 units, the average cost would be $2 per unit.

MR. VARIABLE: You are lucky—all you need is more volume. My problems are more complex. I have plenty of volume. My fixed costs are also $100,000 and I am selling 100,000 units of product. My variable costs are $1.90 per unit, which is $0.10 less than my selling price of $2.00. What is your selling price?

MR. FIX: My selling price is $11 per unit.

Required

(a) Compute the incomes presently being earned by the firms of the two gentlemen.

(b) Assume that Mr. Fix could increase his volume to 200,000 units by decreasing his price to $1.80 per unit. Would this price reduction be desirable, assuming that the present plant capacity is adequate?

(c) Assume that Mr. Variable could sell only 50,000 units if he raised his price to $4 per unit. Would this price increase be desirable?

(d) Assume that Mr. Variable could sell 300,000 units of product if he decreased his price to $1.93. Is this price decrease more desirable than the present price, or the price suggested in part (c)?

(e) The generalization is often made that "with high fixed costs, the only answer is to increase production and sales." Discuss the validity of this statement.

30

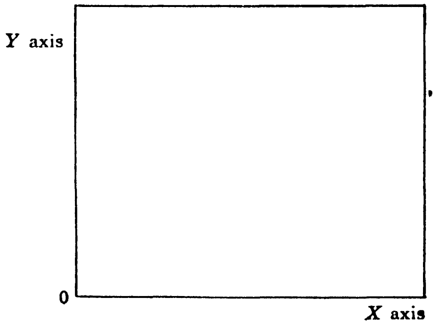
Break-Even Analysis

THE TERM BREAK-EVEN analysis may be interpreted either in its broad or narrow sense. Taken in its narrow sense, it refers to a system of determining that level of operations where total revenues equal total expenses. In its broad sense it refers to a system of analysis that can be used to determine the probable profit at any level of operations. This type of analysis is extremely useful for forecasting purposes as well as for judging the results of operations.

Usually the break-even analysis is presented graphically. This method of visual presentation is particularly well suited to the needs of businesses, since the manager can appraise the situation at a glance. It bypasses the danger that accompanies many accounting reports, i.e., that the reader will get bogged down in the detail and the many computations and never get to the heart of the matter. The graphical break-even analysis eliminates the detail and presents the information as simply as one desires. Break-even analysis is especially appealing to a person of a non-accounting background.

The Geometry of Graphs. Before beginning with the study of the break-even analysis itself, it is well to review a bit of elementary geometry.

Each graph has two sides which are called *axes.* The *X* axis is the bottom horizontal side. The *Y* axis is the left-hand vertical side.



The plotting of points on a graph may result in a straight line or a smooth curve, or may follow an irregular path. The simplest plot is a straight line. The equation for a straight line is relatively easy to solve, since all the variables in an equation of a straight line are of the "first power" (i.e., they are not squared, cubed, etc.).[1] The basic equation for a straight line is:

$$Y = a + b\,X$$

The small letters a and b represent constants. To solve the equation for a line, it is necessary to solve for these two constants. Once these constants are determined, any value of Y may be solved for any value of X.

The constant a is the intercept of the line through the Y axis (the value of Y where X is zero). It is positive if the line intersects above the X axis, and it is negative if the line intersects below the X axis.

The constant b is the slope of the line. It is the amount that Y will increase if X increases one unit. It is positive if the line slopes upward to the right. It is negative if the line slopes downward to the right. It may have any value from minus infinity to plus infinity, including zero (a horizontal line). Expressed algebraically, the equation for the slope is:

$$b = \frac{\text{change in Y}}{\text{change in X}} = \frac{\Delta Y}{\Delta X}$$

It is possible to solve for the equation of a straight line if two points of the line are known. Assume that the following coordinates are known:

X	Y
5	4
10	5

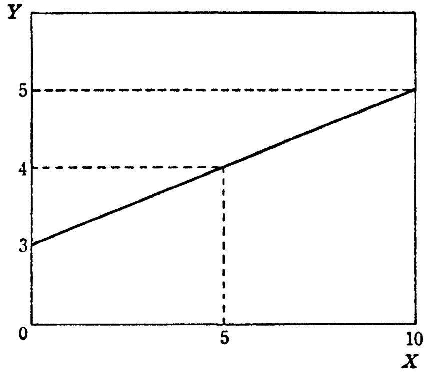
The easiest method of solution is to plot these two points on a graph and then to draw in the line by connecting the two points and extending it to intersect through the Y axis. This gives the value of a the intercept of the Y axis. The slope may be determined by dividing the change in Y by the change in X.

$$b = \frac{\Delta Y}{\Delta X} = \frac{5-4}{10-5} = \frac{1}{5} = 0.2$$

$$a = 3$$

$$Y = a + bX$$

$$Y = 3 + 0.2X$$



An alternative method of solving for a is to first solve for b and then, substituting in the equation for b, solve for Y when X is zero.

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[1] A number of the first power if it does not have an exponent accompanying it. Thus X is of the first power, while X^2 is of the second power.

$$b = \frac{\Delta Y}{\Delta X} = \frac{Y_1 - Y_2}{X_1 - X_2}$$

$$0.2 = \frac{Y - 4}{0 - 5}$$

$$Y - 4 = 0.2\ (0 - 5)$$

$$Y - 4 = -1$$

$$Y = 3 \quad (\text{when } X \text{ is zero; thus } a = 3)$$

With the equation it is then possible to solve for Y for any value of X. What is the value of Y if X equals 15?

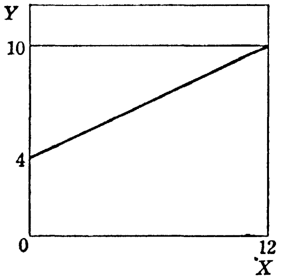
$$Y = a + bX$$

$$Y = 3 + 0.2X$$

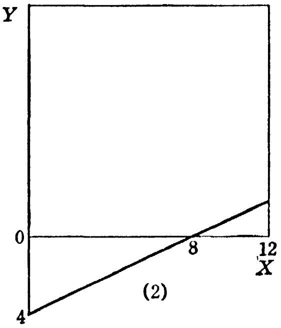
$$Y = 3 + 0.2(15)$$

$$Y = 6$$

Determine the Equations for Lines Plotted on the Following Graphs



(1)



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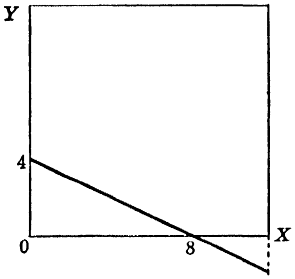

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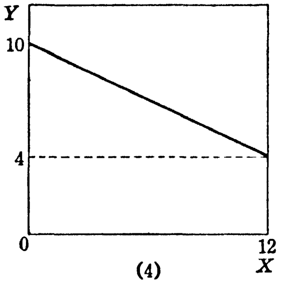

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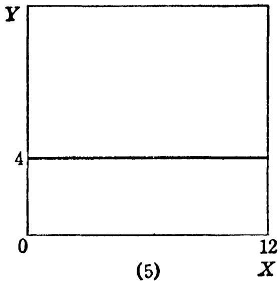

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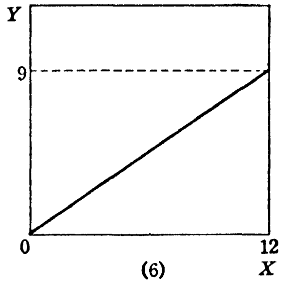


(6)

Answers

	$Y = a + bX$
Graph 1	$Y = 4 + 0.5X$
" 2	$Y = -4 + 0.5X$
" 3	$Y = 4 - 0.5X$
" 4	$Y = 10 - 0.5X$
" 5	$Y = 4 + 0X$ or $Y = 4$
" 6	$Y = 0 + 0.75X$ or $Y = 0.75X$

Plotting Total Revenues and Total Expenses. By following simplifying assumptions, total expenses and total revenues can both be plotted as straight lines. The exceptions to the assumptions will be discussed later, but in general the assumptions are fairly realistic.

Assuming that the price of the product being sold is set, then total revenues will be a function of the units sold. At zero units sold, total revenue will be zero. Thus the total revenue line will pass through the origin of the graph, and the value of the constant a is zero. The value of the constant b (the slope of the line) will be equal to the price per unit. Thus the equation for the total revenue line will be:

$$Y = bX$$

Y = the total revenues
X = the units sold
b = the price per unit

The plot of total expenses assumes that all expenses are fixed or are variable. By definition there will be fixed expenses at zero sales; thus the value of a, the Y axis intercept, is equal to the fixed expenses. The value of the constant b is equal to the variable cost per unit. For every additional unit sold, the total expense will increase by an amount equal to b. To avoid confusion with the equation for the total revenues, the various components (except X) of the equation for total expenses will be accompanied by a "prime"; thus Y becomes Y'.

$$Y' = a' + b'X$$

Y' = the total expenses
a' = the fixed expenses
b' = the variable expenses per unit of product
X = the units sold

Example

The price of the product being sold is \$1.50 per unit. The fixed expenses are \$100, and the variable expenses per unit are \$0.50.

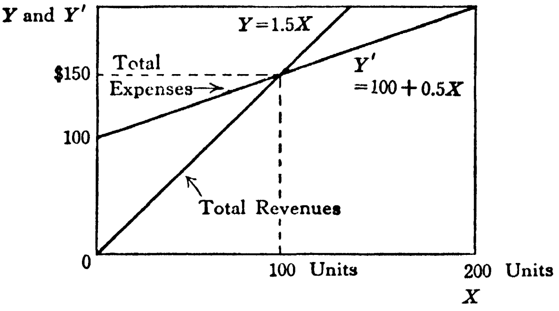
Determine the equations for total revenues and total expenses, and plot them on one graph.

Solution: The equation for the total revenue line is

$$Y = bX$$
$$Y = 1.5X$$

The equation for the total expense line is

$$Y' = a' + b'X$$
$$Y' = 100 + 0.5X$$



The Break-Even Point. By definition the break-even point is that amount of sales where the total revenues equal the total expenses. The firm neither makes a profit nor suffers a loss.

If the total revenues and total expenses are plotted graphically, as they were in the preceding example, the lines will intersect at one point (if they do not intersect, it means that there is no level of operations where the firm can break even). The intersection of the total expense and the total revenue lines determines the break-even point. It is the level of operations where revenues equal expenses. The break-even point in the preceding example is at sales of 100 units. With sales of 100 units the total revenues will be $150, and the total expenses will be $150. If the firm sells less than the 100 units, it will suffer a loss; if its sales rise above the 100-unit level, a profit will be realized.

The break-even point may be solved algebraically as well as graphically. To do so, we should assume that the facts are the same as they are in the above example.

$$
\begin{aligned}
Y &= 1.5X \\
Y' &= 100 + 0.5X \\
Y &= \text{total revenues} \\
Y' &= \text{total expenses}
\end{aligned}
$$

At the break-even point Y must equal Y'; thus

$$
\begin{aligned}
1.5X &= 100 + 0.5X \\
X &= 100 \text{ units}
\end{aligned}
$$

The break-even point is sales of 100 units.

Another method of solving for the break-even point makes use of the following analysis. Each unit sold "recovers" an amount that is equal to the difference between the selling price and the variable costs. To find the break-even point, we should divide the fixed costs by the amount that is "recovered" by each unit.

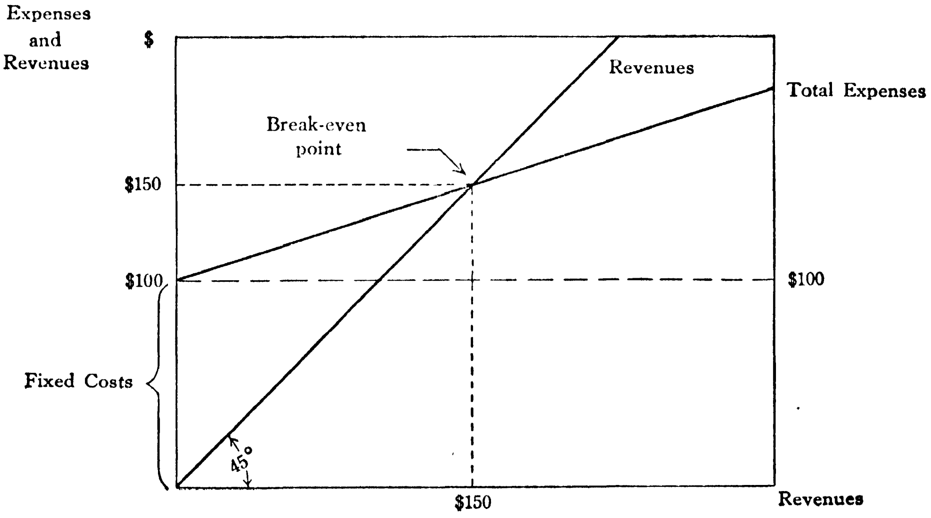
$$\text{Break-even point} = \frac{\text{fixed costs}}{\text{selling price} - \text{variable costs}}$$
$$= \frac{100}{1.50 - 0.50}$$
$$= \frac{100}{1} = 100 \text{ units}$$

Break-Even Charts: The Different Forms. The break-even chart takes many different forms. The needs of the specific situation should dictate the choice of the form to be used.

One of the things that will cause break-even charts to vary is the choice of the factor to be measured on the *X* axis. The following items will be found measured on the *X* axis:

Unit Sales
Units Produced
Dollar Sales
Dollar Production
Per Cent of Capacity, Production
Per Cent of Capacity, Sales

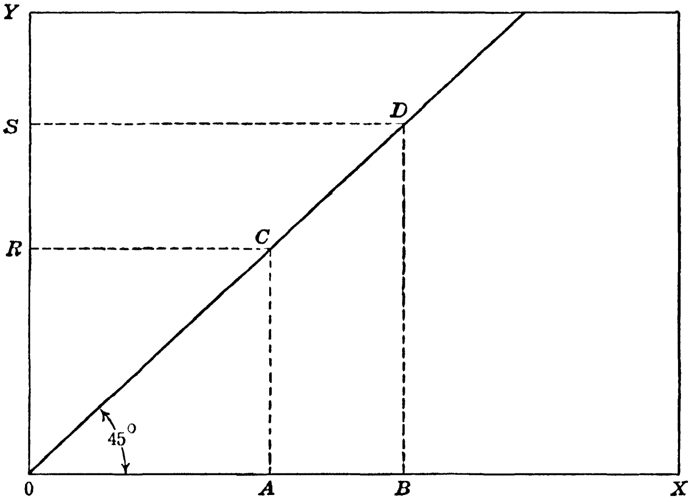
The firm may break even in terms of production or sales; thus the choice between production and sales. In a technical accounting sense, revenue is not realized until the sale is made; thus, strictly speaking, the only true break-even analysis will have the *X* axis measure sales. Having made this decision, the choice must still be made whether to measure units sold, or to express sales in terms of dollars or as a percentage of capacity. All are useful. The use of dollar sales has two advantages. It may be used because it simplifies the presentation of the graphs and despite the sale of products of



different dollar value per unit. If dollars of sales are measured on the *X* axis, and *if the Y axis has the same scale as the X axis,* then use may be made of a 45-degree construction line. This line derives its title from the fact that it is drawn at a 45-degree angle to the *X* axis. It is used to represent sales; thus only the expense line has to be actually drawn in.

Given the same information as before, the preceding chart illustrates the use of this construction line and the measuring of dollar sales (revenues) on the *X* axis.

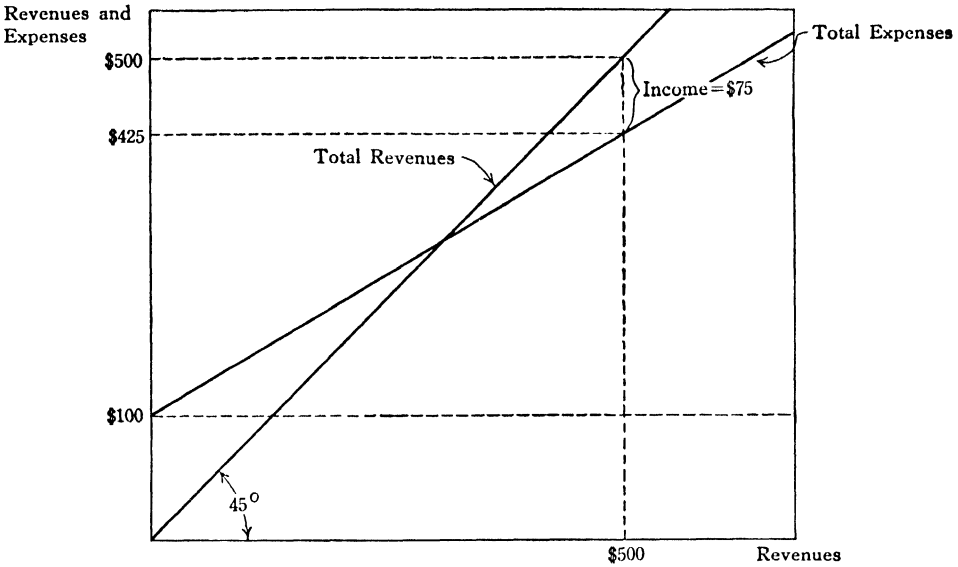
The use of this construction line is possible because of the characteristics of a 45-degree isosceles triangle and the fact that the opposite sides of a rectangle are equal.



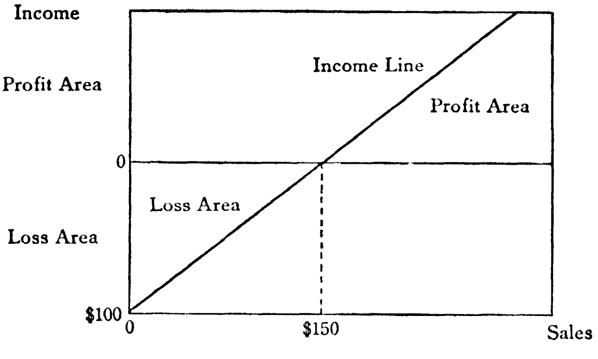
In the accompanying diagram *OA* is equal to *AC* because they are two sides of an isosceles triangle opposite the 45-degree angles. *AC* is equal to *OR,* since they are opposite sides of a rectangle; thus *OA, AC,* and *OR* are all equal. If revenues are measured on the *X* axis, they can also be measured on the *Y* axis; for example, *OA* equals *OR,* and *OB* equals *OS.* The line *OCD* represents revenues, since any point on the line may be measured either on the *X* axis or the *Y* axis.

If an expense line is added, the expected income for any level of revenue may be determined by finding the difference between the revenue line (the 45-degree line) and total expense line. In the following diagram the income is $75 when the sales are $500 (the expenses are $425).

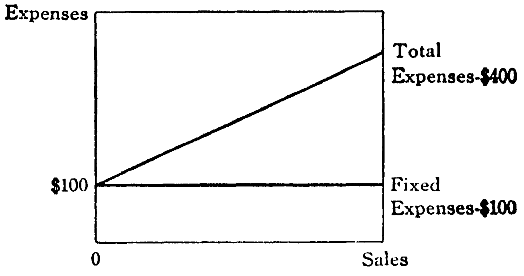
A break-even chart of this nature finds its greatest use in those situations where total expenses at different levels of sales are to be plotted. Using this type of chart gives a break-even chart, even though only the total expenses are directly plotted.

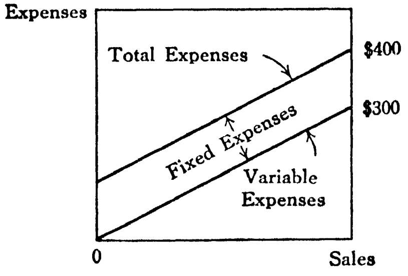


Another type of break-even chart plots neither expenses nor revenues, but rather the net of the two, i.e., income. This form has the possible advantage of being easier to interpret. Note that at zero sales, the loss is equal to the fixed costs.

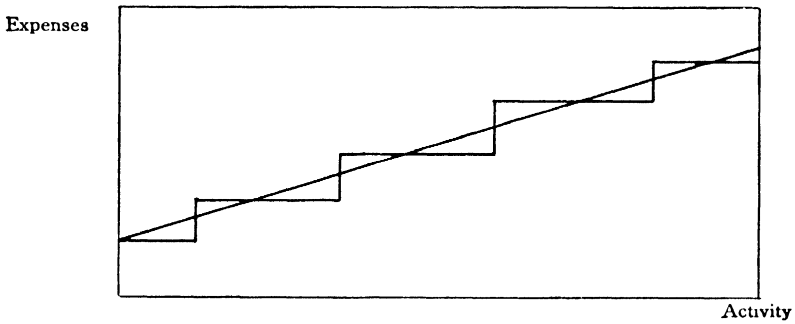


When total expenses are plotted, the fixed expenses are sometimes plotted first, and then the variable expenses are plotted on top of the fixed expenses. It is also possible to plot them the other way around. The following two graphs illustrate the two different techniques:

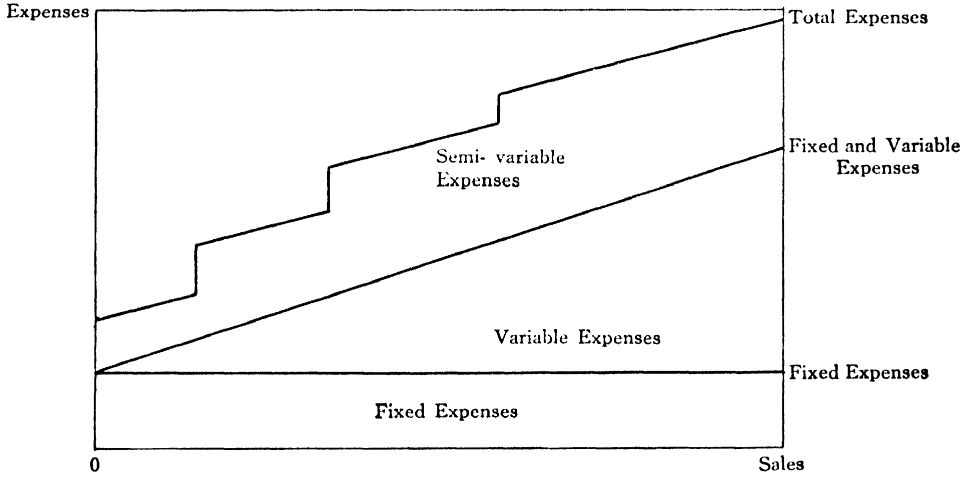




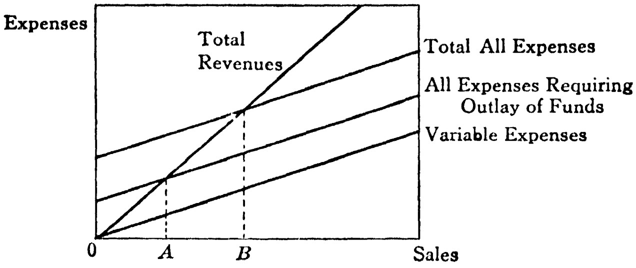
Some expenses are neither variable nor fixed. Expenses of this nature are usually lumped together into one classification and called *semi-variable* expenses. If these expenses can be predicted, then they do not harm our analysis. If the semi-variable expenses are of relatively small amounts, then it is sometimes assumed that a straight line fairly well approximates them. The following graph illustrates a semi-variable expense and the straight line approximation.



If the semi-variable expenses are significant in size and a more exact treatment is desired, then they can be added to the fixed and variable expenses. The graph of total expenses will then appear as follows:



Special Break-Even Analyses. There are many special applications of the break-even analysis techniques. One of the most useful applications is in the determination and illustration of the "cash" break-even point. The objective is to determine the point of sales at which current outlays are recovered. The revenue-total expense break-even point may be illustrated on the same graph as the "cash" break-even point.



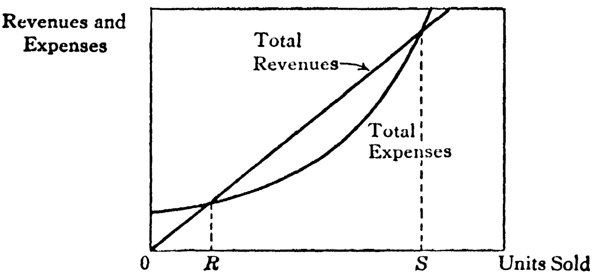
In the accompanying graph, the "cash" break-even point is at sales of *OA*. At that level of sales the current position of the firm can be maintained. The revenue-expense break-even point is *OB*. At that level of sales the total assets of the firm can be maintained (it should be recognized that the current position can be changed by factors other than operations; for example, dividends and purchase of equipment).

It is possible to show on the break-even chart the detailed breakdown of the expenses. Thus, labor, material, taxes, etc., could all be plotted on the graph to show the make-up of the total expenses. A danger is that the graph will become too cluttered. If too many items are plotted, the "forest may not be seen because of the trees."

Another possibility is to draw another line above the total expenses to show the total expenses and dividends on stock. This has some use since it shows that level of sales which must be obtained in order to maintain the level of dividends. On the other hand there may be an implication that dividends on stock are a fixed expense. Dividends are not fixed but are a voluntary distribution of earnings. Subject to this limitation this type of break-even chart will have some application, especially to a divisional manager who is responsible for maintaining a certain dividend payment to the parent company.

Relaxing Our Assumptions. Up to here it has been assumed that the total revenue and the total expense lines are straight lines. It is likely that neither of these will be a straight line in practice.

The plot of total expenses will be affected by the fact that as more variable factors of production are applied to the fixed factors, a point will be reached where there is a decrease in efficiency. This will cause the total expense curve to have an increasing slope. It is possible that at the low levels of production, efficiency was actually increasing; thus the slope of the total expense curve would be decreasing at that level of production. This latter possibility can usually be ignored, with no harm to the analysis, since the firm is more likely to be operating at a level where the marginal costs of successive units are either constant or increasing.



It is interesting to note that there are two break-even points in the accompanying graph, one at *OR* and one at *OS*. This occurs because it is assumed that the total expense curve, instead of being a straight line, curves upward (reflecting decreasing efficiency). The firm will actually attempt to operate somewhere between sales of *OR* and *OS* units. The point of maximum profitability will be where the curve and the line are furthest apart (where the difference between the revenues and expenses is the greatest).[2]

The total revenue curve, when plotted as a straight line, assumes that there will be no decreases in prices necessary to accomplish the increased sales. If it is assumed that in order further to increase unit sales, it is necessary to decrease price, then the shape of the total revenue plot is not a straight line. An attempt to plot the different total revenues resulting from different unit sales, assuming different pricing policies, would complicate the analysis. A simple solution of this problem is to plot the total revenues and expenses, assuming different pricing policies on different graphs. It is likely that the total expense curves will also be different because of the necessity of changing selling policies to correspond with the pricing policies.

Charts A and B illustrate the type of analysis that may be used to decide which of various pricing policies will be most desirable. Chart A shows

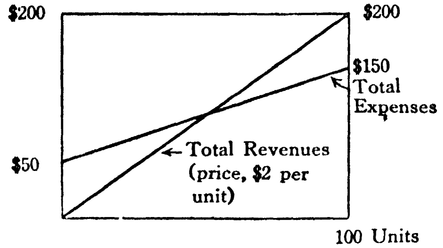


Chart A

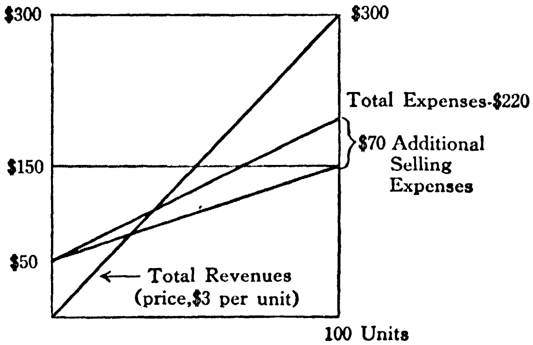


Chart B

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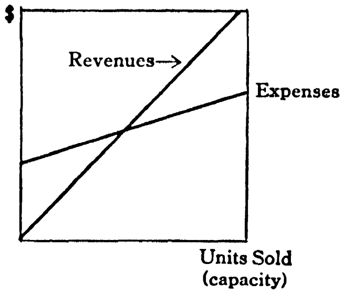
[2] This point is also where the tangent of the total expense curve is parallel to the total revenue line (thus marginal revenues equal marginal expenses).

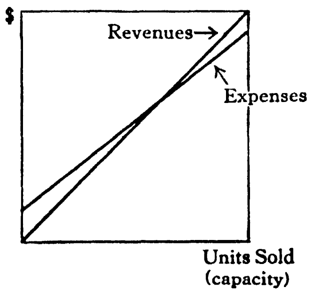
the break-even analysis with a price of $2 per unit. Chart B shows the break-even analysis assuming a price of $3 per unit. Chart B is exactly similar to Chart A except that the total revenue line has a greater slope, reflecting the higher price, and there are additional selling expenses anticipated. Which is the better course of action? The answer will depend on a bit of information purposely left off the charts. What will be the number of units sold (the level of activity) following each policy? When this information is obtained and evaluated, the decision can be made.

The justification for using straight lines to represent total revenues and total expenses is twofold. For one thing it is much simpler to make that assumption. Secondly, the error is not so great as one would think by looking at a graph of total expenses or total revenues. Actually, in the area where the firm is likely to operate, both the total revenue and the total expense curves approximate straight lines. The straight line assumptions are probably as accurate as more complicated curves. The problem of what would happen if prices were lowered may be handled by drawing another break-even chart with the new total revenue line reflecting the decreased price. This new line would still be a straight line, and the procedure would show the different profits that could be expected from different pricing decisions. Another possibility would be to plot the most likely revenues for different prices.

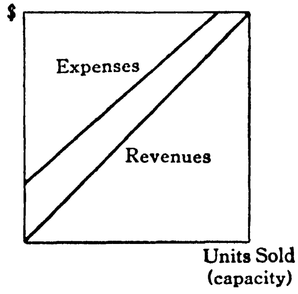
Product Break-Even Charts. Break-even analysis is useful for analyzing all different levels of operations. Thus a chart can be drawn to show the break-even point for Ford Motor Company, or a chart can be drawn to show the break-even point for the Ford Division or for a particular model of Ford motor car. The break-even chart drawn for a specific product may often be the most useful. Using the break-even analysis, one is able to detect a product that will not be profitable no matter how many units are sold. Too often the failure to make a profit is blamed on the lack of sales volume, whereas the real culprit is the characteristics of the revenue-expense relationship. Consider the following three break-even charts made for three different products.



Product A



Product B



Product C

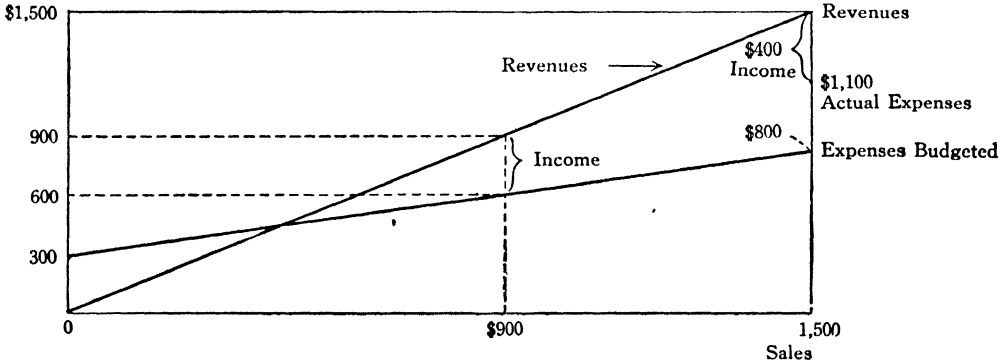
Assume that the three graphs above are all drawn to the same scale and that price changes are out of the question. Product A clearly has more potential for profitability than products B and C. Product B can show a small profit, but no matter how great the sales become, it can never be very profitable (compared with the profit which product A can make). Product C cannot make a profit unless the price is increased (changing the slope of the total revenue line) or the total expense line is changed. In an actual situation the actual maximum profit that each of these products could make would be computed from the graphs.

Graphs of the nature described here will be adequate to decide whether to add any of the three products. If the products are currently being produced, and the decision that has to be made is whether or not to continue to produce them, then break-even charts showing other information will be useful. For example, the break-even point for out-of-pocket costs is relevant, as is the break-even point for avoidable costs. Before a product is dropped, you will want to know whether you are going to be better or worse off without it. The break-even chart can help in making that decision.

Using Break-Even Charts for Profit Control. The break-even charts have many uses, but two of the most important uses are classified as "profit control." These uses are:

1. Forecasting the profit of the next period if certain courses of action are taken.
2. Comparing the actual profit of the past period with what it should have been according to the break-even analysis.

Assume that sales equal to $900 were forecasted. At that level of sales profits of $300 are to be expected. If this level of profits is satisfactory, then the plans will be carried out and the firm will be working toward that end.



At the end of the period the actual sales are $1,500, and the actual profits are $400. The sales manager may be praised, but someone will have to explain why the profits are not equal to the forecasted profits for the *actual* level of sales. Thus the break-even chart lends itself to a flexible control of the costs and profits. The absolute level of profits is not so important as what the profits should be at the actual level of activity. In this example the actual profits were $400, while the budgeted profits were $300, but this was not cause for rejoicing. The profits for sales of $1,500 should have been $700, not $400. Expenses should have been $800, not $1,100.

Limitations of Break-Even Analysis. The break-even analysis is a very useful tool, but like many gadgets, it is sometimes oversold by its adherents. If the user of a break-even chart is aware of the limitations of this type of analysis, then it becomes a safe tool. Among the points raised against the use of break-even analysis are:

1. The total expense plot is not actually a straight line. (*Ans.:* If the total expenses are known not to have the characteristics of a straight line, then they should be drawn differently. The break-even analysis does not depend on the assumption of a straight line for total expenses. It does require an ability to predict expenses at different levels of sales.)
2. The total revenue line is not a straight line. (*Ans.:* In many cases it is a straight line; this is especially true when the individual seller cannot influence the price. If the seller has a pricing decision to make, a series of break-even charts is useful.)
3. The *X* axis cannot measure "units sold," since many unlike types of product are sold by the same firm. (*Ans.:* This is true. Where there are unlike products being sold, the *X* axis cannot measure the number of units sold. However, measuring units sold on the *X* axis is useful if the plant is making only one product. It is also useful when the break-even analysis is being made for only one product.)
4. A break-even analysis is of doubtful value when the firm is selling many products with different profit margins. (*Ans.:* There is some truth in this statement. However, a series of break-even charts can be made to show the results of sales of different product mixes. Break-even charts of the sales of the individual products are also useful.)
5. The objectives gained by break-even analysis can be also accomplished by schedules. (*Ans.:* This is essentially true, although the break-even analysis has the advantage of offering a *picture* of the possible results at *all* levels of operations. Schedules cannot accomplish this as well.)
6. Break-even analysis implicitly assumes that income is influenced only by changes in sales, i.e., changes in inventory will not directly affect income. If variable costing (direct costing) is used, this will be valid; otherwise, changes in inventory will affect income, since the absorption of fixed costs will depend on production not sales. (*Ans.:* The break-even analysis when used for planning can assume that the finished goods inventory will be unchanged. If the break-even chart is being used for profit control, and if variable costing is not being used, then changes in inventory will affect the actual income.)

QUESTIONS AND PROBLEMS

30–1. Plot each of the given equations. How can you determine (without plotting) whether an equation represents a curve or a straight line?

(a) $Y = 20 + 3X$
(b) $Y = -20 + 0.5X$
(c) $Y = 4X^2$
(d) $Y = 15 - 2X$

30–2. Assume that the equation for total expenses (Y) for the Rose Company is

$$Y = 20{,}000 + 0.8X$$

If X represents dollars of sales, what is the significance of the $20,000 and the 0.8?

30–3. Assume that the equation for the total revenues of the Rose Company is

$$R = 3Q$$

in which R = the total revenue
Q = the number of units sold

Required

(a) What is the significance of the 3?
(b) Substitute Q (units) for X (dollars of sales) in the equation for total expenses. (See Prob. 30–2.)
(c) Determine the break-even point in terms of dollars and units. Solve graphically and algebraically.

★ 30–4. To determine the break-even point, the company plotted total revenues on the X axis, and total expenses and total revenues on the Y axis. The president of the firm wanted to know the effect of a 10% increase in price on the break-even point. The analyst shifted the slope of the revenue line and read off the new break-even point. Comment on this procedure.

30–5. Given the following equation, determine what X, Y, and Z represent.

$$\text{Break-even point} = \frac{X}{Y - Z}$$

30–6. The Maple Company

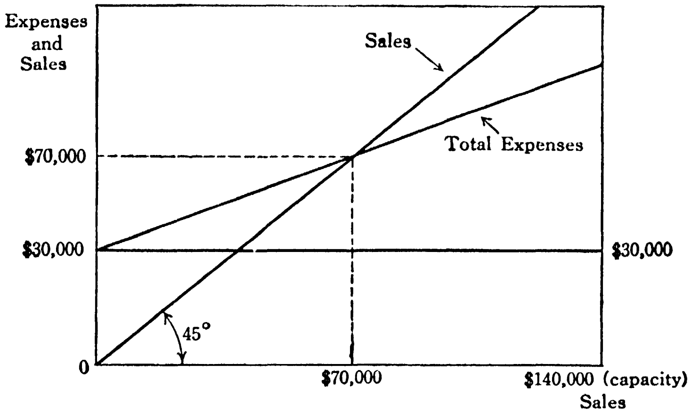
Required

(a) Given the following information, plot a break-even chart using a 45-degree construction line:

Price = $3 per unit
Variable cost per unit = $2.60
Fixed costs = $10,000

(b) Using the same information, plot a break-even chart, using only an income line.

30–7. The Moore Company



Required

(a) The break-even point is $________ of sales.
(b) At the break-even point the income is $________.
(c) The fixed costs are $________.
(d) The variable costs for sales of $140,000 would be $________.
(e) Operating at 80% of capacity, the variable costs would be $________.
(f) Operating at capacity, the income would be $________.
(g) Operating at capacity, the income per dollar of sales (the earning rate) would be ________%.
(h) Operating at $70,000 of sales, the income per dollar of sales (the earning rate) would be ________%.
(i) If the selling price per unit were lowered, the total expense line would shift (*upward, downward*). Choose one. Explain.
(j) If the price per unit is $3.50, then the break-even point is ________ units.

30–8. The Brake-Even Company

The Brake-Even Company manufactures three general types of brakes, automobile, truck, and small airplane brakes. The management of the Brake-Even Company is concerned because of the fluctuations in income which have been experienced in the past few years. Some members of management have also suggested that one or more of the product lines should be dropped.

The company has made an analysis of its sales and income by product line (each of the three products is organized as a department for manufacturing and sales purposes).

		Sales of Brakes			Income before Taxes		
Year	Quarter	Auto	Trucks	Airplanes	Auto	Trucks	Airplanes
1956	1	$2,000	$ 500	$200	$200	(450)	($100)
	2	2,400	600	300	440	(440)	(50)
	3	3,200	1,200	400	920	(380)	-0-
	4	1,500	2,000	800	(100)	(300)	200
1957	1	2,100	1,500	500	260	(350)	50

(All dollar figures in thousands)

An analysis of the expenses associated with the sales of the product disclosed the following information:

	Auto Dept.	*Truck Dept.*	*Airplane Dept.*
Variable Costs per Dollar of Sales, 1956			
Material	$ 0.10	$ 0.25	$ 0.15
Direct Labor	.21	.50	.22
Variable Overhead	.05	.10	.06
Variable Selling Expenses	.04	.05	.07
	$ 0.40	$ 0.90	$ 0.50
Fixed Costs for 1956			
Directly Associated With the Department:			
Avoidable (foremen's salaries, etc.)	$1,600,000	$ 80,000	$ 40,000
Unavoidable (depreciation of special equipment, etc.)	400,000	320,000	160,000
Allocated from Other Departments (including administrative costs)	2,000,000	1,600,000	600,000
	$4,000,000	$2,000,000	$800,000

The unavoidable costs cannot be avoided by sale of the equipment, since the removal costs would approximately equal the sales price. General overhead would not be reduced by elimination of any one of the product lines.

For internal reporting purposes the company charges all fixed costs to the period in which they are incurred and only variable costs are considered a cost of product.

Required

(a) Prepare an analysis explaining the fluctuations in income.

(b) Make recommendations as to the desirability of continuing the sale and production of any of the products.

(c) Prepare a break-even chart for the auto department. Explain the difficulties connected with preparing one break-even chart for the company as a whole.

(d) Assume that during the first quarter of 1957 the auto brakes were sold at a price of $20 per unit. If the price were dropped to $15 per unit, 200,000 would be sold (according to the company's economist). Is the reduction in price desirable? Assume that the variable costs are $8 per unit.

30–9. The New York Company manufactures folding chairs for sale to clubs, commercial establishments, and individual consumers. The sales for the past several years have been cut back to 40% of capacity. At this level the company produces 60,000 chairs, which it sells at an average price per chair of $2.10. Total costs at the 40% level are made up of $54,000 for fixed items and $90,000 for variable items. Variable costs are known to change exactly in proportion to output.

Required

(a) If the average selling price remains the same as it has been in the past, at what level of activity will the company break even?

(b) What would the company's profit be if it could operate (and sell) at capacity?

(c) Assume that the company computes the fixed cost per unit, using capacity level of operations. What is the average total cost per unit?

(d) Assume that a new customer offers the New York Company $1.70 per unit for its product. Provided that there are no effects on sales to old customers (and no legal complications), should the New York Company accept an order for 40,000 chairs? Briefly justify your answer.

31

Measuring Performance

TOP MANAGEMENT IS constantly attempting to measure the performance of junior executives and supervisors. This is necessary in order to determine who is worthy of promotion, as well as to uncover those areas where the profit potential is not being fully realized.

There are various tools available for measuring performance. As in other areas of accounting the accuracy of some of the measurements is subject to interpretation. The limitations of the accountant's ability to measure performance with absolute correctness must be recognized. If several of the tools described in this chapter are used to judge performance, and if the possibility of distortion is investigated and eliminated when possible, then these tools will be useful to management. It should be noted that the single most meaningful measure of over-all performance, income, is not described in this chapter, because the problems of measuring income are covered throughout the text.

Investment Turnover. The intensiveness of the use of the investment is of significance. Investment, as used in this chapter, refers to the funds invested in buildings, equipment, inventories, receivables, cash, etc. The ratio of sales to investment gives one measurement of the degree of utilization of the resources.

$$\text{Investment turnover} = \frac{\text{sales for year}}{\text{investment}}$$

If the computation is being made for a month's sales, then the equation becomes:

$$\text{Investment turnover} = \frac{\text{sales for month}}{\text{investment}} \times 12$$

Investment is used in several of the computations, and some warning is necessary relative to any ratio that uses this item. The measurement of investment is frequently only an approximation at best. The area of greatest difficulty is in valuing the investment in fixed assets; there are two main problems:

Assets purchased under different price levels.
The method and extent of depreciation.

If the building of Plant A was built in 1940, the building of Plant B was built in 1950, then the same cubic footage of space for Plant B will be recorded at three times to four times the cost of the cubic footage of Plant A. This occurs because of inflation, but it will distort a comparison of the degree of utilization of the two plants. Another difficulty will arise if the two plants are being depreciated by using the straight-line method of depreciation. The rate of utilization of Plant A will tend to be higher than Plant B because the book value of the plant will be less, since Plant A will have been depreciated for a longer period of time. If the two plants have used different methods of depreciation (for example, if Plant A had been arbitrarily written off during the period of World War II), the distortion will be even greater.

Example

The ABC Company computes investment turnover, using the net investment (depreciation accruals are subtracted) as of the beginning of the year. Assume that the plant has a life of two years and sales for each year of life of $100,000. No other assets are used.

Situation 1: Plant A, which cost $20,000, was purchased on January 1, 1957. Compute the investment turnovers for 1957 and 1958.

$$\text{Investment turnover, 1957} = \frac{100{,}000}{20{,}000} = 5 \text{ times}$$

$$\text{Investment turnover, 1958} = \frac{100{,}000}{10{,}000} = 10 \text{ times}$$

Investment decreases from $20,000 to $10,000, since the straight-line depreciation for the first year is $10,000. If a different method of depreciation had been used, the investment turnover for the second year would have been different.

Situation 2: Plant B, exactly similar to Plant A, was completed on January 1, 1958. Due to inflation of building costs, the plant cost $40,000. The sales for 1958 were $100,000. Compute the investment turnover for 1958 and compare the turnover with that of Plant A.

$$\text{Investment turnover, 1958} = \frac{100{,}000}{40{,}000} = 2.5 \text{ times}$$

Plant B has an investment turnover of 2.5 times, which compares unfavorably with either year of the life of Plant A. The plant built earlier has two advantages. It was built before the inflation, and it has been depreciated. If Plant B is technologically more advanced, these advantages may be balanced out by the increased efficiency.

The distortion caused by the change in the price level can be corrected by adjusting the cost of the plants into common dollars. The distortion caused by the use of straight-line depreciation is somewhat more difficult to eliminate. Much depends on whether the output of the asset is affected by the age of the asset. If output is inversely proportional to age, then it may be that it is logical to use the depreciated value of the asset. If output is not affected by the age of the asset, then it may be logical to use the undepreciated cost of the asset, adjusted for changes in the price level, as the base for computing the investment in the fixed asset.

Earning Rate. The earning rate gives an indication of how efficiently the plant operated as it gained the sales.

$$\text{Earning rate} = \frac{\text{earnings}}{\text{sales}}$$

The primary problem here lies in determining the earnings of the period. All the problems of income measurement are involved here, and they are compounded by the fact that the period of time for which the income is being measured is frequently of short duration. The comparison of different plants, and to some extent the comparison of the same plant for several periods, is complicated by the following factors:

1. Inventory flow problem (FIFO, LIFO, Average Cost, etc.).
2. Depreciation cost (the method of computing depreciation).
3. Depreciation cost (the problems arising from the change in the price level).
4. Overhead absorption (changes in the level of activity or sales will affect profit).
5. Different product mix (some products may have higher profit margins than other products).
6. Expensing or not expensing supplies and small tools when purchased (some plants expense supplies and small tools when purchased; others maintain them in inventory; this will also affect the investment of the plant).

Fairly satisfactory methods of adjusting for the first four items will be covered in Chapters 35–36 or have already been discussed in Chapter 28. The fact that products have different profit margins can be handled by making analyses by product as well as by plant. Item 6 in the list of factors is a result of poor accounting practice and should be eliminated by eliminating the poor practice. Supplies and other similar items should be maintained in inventory until they are used, and then they should be expensed. Unfortunately the policy of expensing all items as rapidly as possible is encouraged by the fact that it is "smart," since it reduces the total income tax paid to date, reduces property taxes in some areas, and reduces the investment in plant (thereby increasing the return on investment).

Return on Investment. The return on investment is the ratio of the earnings to the total investment in assets employed. It gives an indication of the efficiency of the utilization of the plant as well as the intensity of utilization.

$$\text{Return on investment} = \frac{\text{earnings}}{\text{investment}}$$

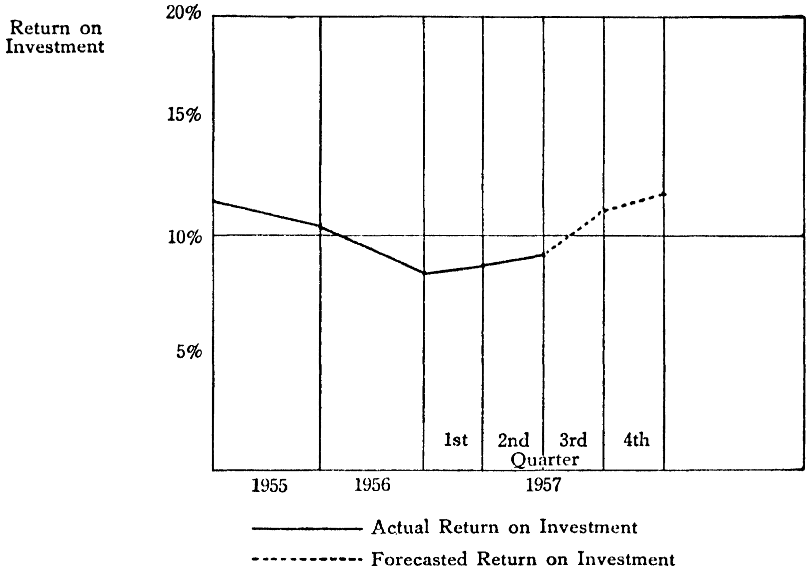
The return on investment may also be computed by making use of the two rates already determined.

$$\text{Return on investment} = \text{investment turnover} \times \text{earning rate}$$

$$= \frac{\text{sales}}{\text{investment}} \times \frac{\text{earnings}}{\text{sales}} = \frac{\text{earnings}}{\text{investment}}$$

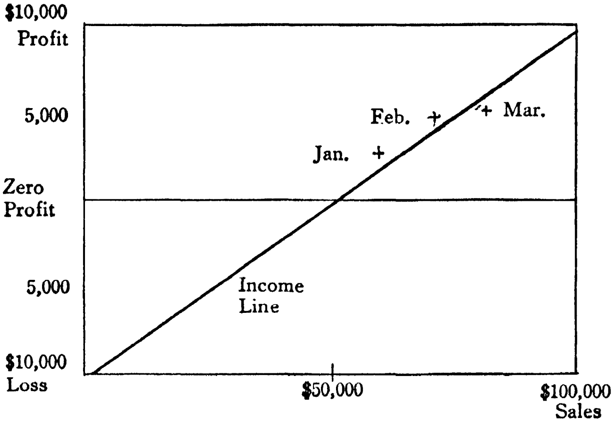
The return on investment is probably the most significant of the computations made to this point. Unfortunately it picks up all the weaknesses connected with the measurement of the investment and the measurement of the earnings. Despite these limitations it is a very useful tool for measuring the performance of divisional managers.

Graphical Presentation. The results of the preceding computations can all be plotted on graphs so that the results of successive periods may be compared. The forecast for the next period may be placed on the same graph so that it may be compared with the actual results.



The 10% line represents the *expected* return for this investment.

A Flexible Budget and Measuring Performance. The flexible budget has been discussed previously in the chapters on break-even analysis (Chapter 30) and the control of costs (Chapter 26). It is mentioned here to stress the fact that it can be a useful device to measure performance because it does take into consideration the effects of changes in activity. The flexible budget type of analysis used in this manner makes an implicit assumption that *all the fixed costs are considered as period costs (a variable costing procedure).*



The accompanying chart is only one of many types of chart which may be used. The income line represents the budgeted income for different levels of sales. At zero level of sales the budgeted loss is $10,000; thus the fixed costs are $10,000. Each month the actual incomes for the actual sales are plotted on the chart. In January and February the plant was more efficient than budgeted; in March it was less efficient. This method of presentation is extremely useful, since it shows at a glance the actual profit compared with what it should have been. The information is presented simply, without the complications of confusing titles which often accompany accounting reports.

Controlling Current Assets. The plant manager often has to take the plant and equipment as given to him; thus he cannot control the investment in long-lived assets. He can control, however, the current assets being used. The largest and most important items are cash, accounts receivable, and inventories. The subject of controlling inventories has been discussed in detail in Chapter 27, and similar methods for the control of cash and accounts receivable should be applied. The efficiency of the application of these methods should be checked by watching such measurements as:

Number of Days' Inventory on Hand
Inventory Turnover

Number of Days' Receivables on Hand
Turnover of Receivables
Number of Days' Cash Supply on Hand

Excess investments in current assets will also be disclosed by lower than standard return on investment.

Example

Balance of Accounts Receivable, March 1, 1958	$31,000
Balance of Accounts Receivable, March 31, 1958	29,000
Sales in March	62,000

Compute

(a) The number of days' receivables on hand on March 1.

$$\text{Sales per day} = \frac{\$62{,}000}{31} = \$2{,}000 \text{ per day}$$

$$\text{Number of days' receivables} = \frac{31{,}000}{2{,}000} = 15.5 \text{ days}$$

(b) The turnover of receivables for March.

$$\text{Average receivables} = \frac{31{,}000 + 29{,}000}{2} = 30{,}000$$

$$\text{Rate of turnover} = \frac{62{,}000}{30{,}000} \times 12 = 24.8 \text{ times per year}$$

The turnover may also be expressed in terms of days.

$\frac{365}{24.8} = 14.7$ days (the receivables are turning over at the rate of once every 14.7 days)

Comparable computations can be made for cash and inventories.

Daily Labor Reports. One of the most valuable tools of the plant manager in controlling costs and measuring performance is the daily labor report. This report may take various forms, but it is essentially a comparison of the actual labor incurred (in hours and dollars) each day in various classifications and processes with the standard labor (the labor which should have been incurred). The labor report enables the factory manager to correct inefficiencies as they occur, rather than waiting until they have been happening for a long period of time.

Daily Material and Spoilage Reports. Two other useful reports are the daily (or weekly) material usage report and the daily scrap report. The material usage report compares the actual material used in production with the standard material (the amount of material which should have been used). The report should include quantities and dollars, since not only may a quantity of material be used inefficiently, but there may also be waste in terms of dollars. Thus, using the wrong *size* of steel plate would result in a variance arising from excessive amounts of material used. Using the wrong *type* of steel plate may not result in more material being used, but it may result in more expensive material being used.

Spoilage and scrap reports are important because they may be the first hint that something is wrong with the manufacturing process or the material being used in the process. The sooner this is found out, the quicker it may be corrected and further waste avoided.

Reports of Overhead Costs. Overhead costs should be reported either on a daily or weekly basis. The reports should be by control points. Thus the costs of the production control department will be accumulated so that a report of that department's costs may be made out periodically. This report will measure the ability of the manager of the production control department to control his costs.

Monthly Reports. Costs are controlled daily and weekly, but the results of operations should be summarized monthly. This should be in the form of an income statement and reports explaining the various labor, material, and overhead variances. A position statement should also be made out so that the total investment and the various rates and ratios may be computed. It is extremely important that these monthly reports be made out and placed in the hands of top management shortly after the month ends. This is not an easy task. There are many problems in closing the accounting records, and it is not unusual for monthly reports to be issued more than a month after the period ends. This can be avoided by careful planning and by sacrificing a bit on some of the details.

QUESTIONS AND PROBLEMS

31–1. The Red River Steel Company

Part I. The Red River Steel Company has five operating plants, all engaged in the manufacture of steel plate. The operations of all five plants are comparable in terms of raw materials used and end product.

The central management is concerned with the problem of maintaining a high level of efficiency at the five plants. To ensure that central management is informed, a detailed system of reporting operations has been installed. This system includes the computation of ratios and various other tools of measuring performance.

INFORMATION FOR THE YEAR 1953
(All money figures in thousands of dollars)
(All physical units in thousands of tons)

Plant	Average Investment	Sales	Income	Finished Goods, Average Inventory	Tons of Production	Tons Sold	Capacity
Athos	$10,000	$ 20,000	$ 1,000	20	200	200	400
Black Rock ..	80,000	240,000	12,000	200	2,400	2,400	3,000
Cardiff	90,000	225,000	4,500	450	2,500	2,250	4,000
Danville	50,000	200,000	18,000	100	2,000	2,000	2,500
Great Rock ..	40,000	200,000	12,000	200	2,100	2,000	3,000

Required: Prepare a schedule showing the results of operations for the period. Include in the schedule:

Investment Turnover
Earning Rate (ratio of earnings to sales)
Return on Investment
Inventory Turnover for Finished Goods
Percentage of Capacity Utilized

Part II. Investigation discloses that the plants were all purchased in different years. The Black Rock plant was built in 1949; the Athos, Cardiff, and Danville plants were all built between 1920 and 1930. The Great Rock plant was built in 1939–40.

Since the plants were built in years of such varying general price levels, management has questioned whether the "Average Investment" figures taken from the accounting records are significant. For example, the Black Rock and Great Rock plants both have the same capacity, but the average investment in operating one plant is $80,000,000 and the other $40,000,000. It was decided to adjust all plant acquisitions into dollars of the same purchasing power so that the effects of the changes in the general price level might be eliminated. The wholesale price index was chosen as a fair approximation of the general price level. The plant acquisitions of each year still in use in 1953 were multiplied by "conversion factors" based on the wholesale price index in order to convert them into 1953 dollars (see page 392).

Required: (a) Assume that the allowance for depreciation, adjusted for changes in the price level for the Great Rock plant, is $55,686,000 and that other investment in the plant (inventories, supplies, etc.) total $10,000,000. Using the adjusted information, compute the investment turnover.

(b) Assume that the adjusted depreciation charge, based on the plant expressed in 1953 dollars, would be $2,000,000 greater than the amount computed by using unadjusted original cost. Recompute the earning rate and the return on investment, using this additional information.

ADJUSTMENT OF CAPITAL ACQUISITIONS INTO 1953 DOLLARS (GREAT ROCK PLANT)

Year of Acquisition	Amount Acquired (and still in use) *	Conversion Factor	Plant Acquisitions in 1953 Dollars *
1953	$ 8,900	1.000	$ 8,900
52	——	0.987	——
51	——	0.959	——
50	2,000	1.068	2,136
49	2,000	1.110	6,660
48	——	1.055	——
47	——	1.142	——
46	——	1.399	——
45	——	1.600	——
44	——	1.629	——
43	——	1.643	——
42	——	1.715	——
41	10,000	1.938	19,380
40	30,000	2.155	64,650
39	20,000	2.198	43,960
	$76,900		$145,686

* The amounts in these columns are "cost" and "adjusted cost" before depreciation allowances. Dollar amounts are in thousands.

(c) Comment briefly on whether the figures computed in Part I are more meaningful than those in this part.

Part III. A review of the accounting procedures followed at the plants indicates that all plants use FIFO in accounting for inventory except the Danville plant, which uses LIFO. A review of the Danville plant's inventory records discloses the following information for 1953:

DANVILLE PLANT

	LIFO Valuation	*FIFO Valuation*
Beginning Inventory of Finished Goods	$8,000,000	$8,000,000
Ending Inventory of Finished Goods	3,000,000	6,000,000
Manufacturing Cost of Goods Sold	$163,000,000	$160,000,000

Required: Recompute the investment turnover, earning rate, and return on investment for Danville.

Part IV. All plants except Cardiff follow a procedure of considering fixed costs as period costs and of inventorying only variable costs (a direct or variable costing procedure). Cardiff inventories fixed costs, and at the end of each month allocates the unabsorbed overhead between cost of goods sold and ending inventory. Placing the beginning and ending inventories of Cardiff on the same basis as the remainder of the plants would result in a decrease in average investment of $1,000,000 and a decrease in income for the period of $500,000.

Required: Recompute the investment turnover, earning rate and return on investment for Cardiff.

Part V. Briefly describe other difficulties that may further invalidate the comparison of the different plants.

31–2. The Robert Company

During the year 1957 the Robert Company has reported the following income and sales:

	Income	*Sales*
January	($30,000)	$100,000
February	(10,000)	200,000
March	20,000	350,000

The budgeted fixed costs per month were $100,000 and variable costs were budgeted at $0.60 per dollar of sales. The company considers fixed costs as a cost of the period (variable costing).

Required

(a) Draw a break-even chart for the Robert Company. At what level of sales will the company break even? What comment would you make relative to the results of operations of each of the three months?

(b) If sales for April are forecasted at $450,000, what income should the company earn if it attains the budgeted level of efficiency?

(c) Assume that the sales price of the product being sold has been $5.00 per unit. If the sales price is changed to $5.50, what would be the break-even point? What would be the income for the sale of 50,000 units?

32

Accounting Reports for Management

IN PREPARING ACCOUNTING reports, attention should be focused on who will use the report and how the report will be used. It can be just as bad reporting practice to supply too much information, which overwhelms the reader, as too little, which leaves him guessing.

In preparing a report, the accountant should not feel that he has to conform to a set of rules that places him in a straight jacket. However, there are a few guides that he should keep in mind. The rules will not be valid in all cases because of the differences in the capabilities of top management to digest information and because of variations in the form in which management wants that information. Thus it is necessary to shape the reports to the desires of the parties for whom the reports are being prepared. Nevertheless there are some general guides that should be followed. The following are some of the more important:

1. Summarize detailed or long reports.
2. Report exceptions instead of (or in addition to) the detail. Do not attempt to show all the detail in all reports.
3. Distinguish between controllable and noncontrollable costs.
4. Explain technical aspects of the report.
5. Never distribute machine runs without headings. (These are automatically typewritten lists produced by accounting machines.)

There is a tendency to overpower top management with detail, much of which is irrelevant. Detailed reports going to top management should be minimized, and when presented, should be accompanied by a summary. This summary will enable the reader to bypass the detail if he wishes. Lower levels of management will be interested in more detail, since they are working with the details.

The rule of managing by exception is generally accepted. To carry out this rule effectively, management needs reports that report the exceptions, i.e., the trouble spots. Frequently a company will spend thousands of dollars accumulating and summarizing information to prepare reports that could be economically replaced by reports which reported only the areas requiring attention. If there are 10,000 jobs in production, management does not have to worry about the 9,990 which are on schedule but the 10 jobs that are falling behind schedule. One company with which the author is familiar often sets very tight production schedules, with the result that all jobs are always behind schedule. This means that all jobs receive the attention of management and have to be reported. But by making all jobs priority jobs, no jobs are priority, and the principle of managing by exception is lost because all the jobs are exceptions.

The principle of controllable and noncontrollable costs has been introduced previously. It is repeated here to highlight the fact that a member of management should not be burdened with cost information if he cannot control the costs being reported. Any report that measures a member of management's efficiency should include only those costs which he can control, or at a minimum, should clearly indicate and classify the noncontrollable costs.

Control of Reports. With large corporations one of the biggest areas of possible cost-saving is the reduction of report preparation cost, especially the cost of preparing those reports concerned with the control of cost. There is a tendency for any extensive cost control program to go wild and for reports to create additional reports which serve no useful function. How is this to be prevented, and how can it be assured that the proper reports are being prepared?

The general answer to these questions (and all other problems) is to have capable managers who know what they want, and even more important, managers who only want useful information. Failure to attain 100% perfection in this goal indicates a need for a "report group" which has authority to review the need for new reports before they are authorized and also to review the format and use of old reports.

Report preparation is a large cost of doing business. It is a large cost in absolute as well as relative amounts. Management needs the information supplied by reports, but it needs it on a selective and economical basis. One of the hardest things to find in the business world is a subordinate willing to say to a superior (or a superior willing to listen) that "you don't really need that information" or "the cost of preparing that information would be $110,000. Do you need it that badly?" The slightest request from top management is frequently interpreted as a mandate to spend thousands of dollars to get the information. We prepare elaborate programs to control capital expenditures and to ensure that the funds are wisely invested. Labor and material are controlled with a great deal of care, but the costs connected with preparing reports are often ignored.

The Physical Preparation of Reports. A layman pictures an accounting report to be an array of many numbers, frequently accompanied by some verbal description. This is fairly close to the truth, but there is one missing link. Behind the array of numbers may be literally hundreds of thousands of detailed numbers. This is true in a summary of payroll, material inventory, work in process, etc. This detailed information has to be accumulated, sorted many times, summarized, and then presented. This is an expensive series of procedures, even though the accumulation of information is an art which has progressed rapidly in the past few years. Electric accounting machines, using punched cards, were the first big step toward mechanization of data-processing. The second step was the electronic data-processing machines. Both these processing systems can process information at rapid rates of speed, with the electronic machines far outstripping the older type of punched-card equipment.

These accounting machines have captured the imagination of business men, and it is no secret that the mechanization of record-keeping is progressing at a rapid rate. There seems to be no doubt that these machines will take over more and more of the routine bookkeeping jobs. Nevertheless, there are still several questions which should be asked before placing a record-keeping task on one of these machines:

1. Should the job be done at all?
2. Can the job be done more cheaply by using another process?
3. Can the results be obtained more rapidly by using another process?
4. Is the information more accurately obtained (less chance for error) by this process than by using other processes?

It cannot be assumed that the more mechanical procedure will necessarily give better results. In some cases a manual record-keeping procedure that uses a mechanical file system will do a better job than an elaborate electronic data-processing system. All possibilities should be reviewed before a decision is reached.

Duplication in Reporting. Scientific articles have been written proving a man cannot be 20 feet tall and that a bee cannot be as big as an elephant. The problem of staying alive is multiplied as the organism becomes larger, and the structure of certain component parts of both the man and the bee prevents them from reaching the sizes mentioned. Corporations also probably have a size that is most efficient and beyond which they become so inefficient that they are doomed to failure. To date, this size has not been determined, and when it is finally determined, it may be several times larger than any of our present corporations, for the advent of data-processing equipment seems somewhat to raise the ceiling on efficient size. Nevertheless, as a corporation grows larger, the possibility of inefficiencies due to size increases. Little mistakes become big mistakes when they affect thousands of personnel and hundreds of thousands of units of products being made.

A by-product of size, in the area of reporting, is the danger of duplicating existing reports without the preparers knowing that they are producing the same report. The importance of eliminating duplication is highlighted by the fact that some reports will cost several hundred thousand dollars a year to produce. Duplication of these reports can obviously put a dent in the income of the firm.

Duplication is generally the result of several different departments having need for the same information but not taking the time to find out if someone else is already preparing the information. The following are a few examples of duplication:

1. Both the finance department and the personnel department were preparing a weekly report of the average wage rates of personnel in the different departments. There was considerable overlap in the distribution list of these two reports, yet they existed side by side for several years.
2. Both the production control and the production department were preparing a status report of jobs in process. The information on the two reports was slightly different, but with minor changes the two reporting systems could have been combined.
3. Both the cost accounting and the industrial engineering departments were accumulating direct-labor costs and issuing control reports. This duplication was known, but the two empires were allowed to exist.
4. Production control and accounting were both maintaining complete inventory records for raw material and nonproductive supplies and issuing reports of inventory. The purpose of the duplication was to decrease the possibility of error.

These are only a few examples of duplication, but the duplications illustrated here resulted in a yearly waste of thousands of dollars. Elimination of waste in the area of reports is surely worth while.

Examples of Reports

The following sections will illustrate a few reports and some of the difficulties in making these reports.

Report of Manufacturing Costs. A popular report with accounting textbook writers (possibly with business men also) is the report of manufacturing costs. The exact form of the report will vary, but it will essentially be as follows:

THE SAMPLE MANUFACTURING COMPANY
REPORT OF MANUFACTURING COSTS FOR
MONTH ENDING JANUARY 31, 19–

Work in Process (beginning of period)		$ 20,000
Manufacturing Costs Incurred		
Direct Labor	$60,000	
Material	30,000	
Overhead	70,000	
Total Manufacturing Costs		160,000
		$180,000
Goods Finished during Month		165,000
Work in Process (end of period)		$ 15,000

By changing the form and content slightly, this report can be made to show the manufacturing cost of goods sold for the period.

The report of manufacturing costs is easy to prepare, since the information is accumulated for other purposes and will be readily available. Thus the report is not costly. On the other hand, is it useful? Only in a very limited way, i.e. by supplying general background information. Is there a specific decision that can be made by using this information? Is there a conclusion that can be reached from looking at this report? To both these questions the answer is "no." As presented, the information cannot be used for either purpose. To be useful, the costs have to be placed in some frame of reference. If the physical production of the period were known, if the budgeted or standard costs were known, if the cost and production of the last period were known, then conclusions could be reached and decisions made. What would a useful report look like? The following is an example:

THE SAMPLE MANUFACTURING COMPANY
REPORT OF MANUFACTURING COSTS FOR
MONTH ENDING JANUARY 31, 19–

Comparison of Actual Costs and Standard

	Actual	Standard	Variance, (Favorable) Unfavorable
Direct Labor	$ 60,000	$ 62,000	($2,000)
Material	30,000	36,000	(6,000)
Overhead, Variable	50,000	45,000	5,000
Overhead, Fixed	20,000	19,000	1,000
	$160,000	$162,000	($2,000)

An equally acceptable report shows the costs on a per unit basis. Some firms like to have costs placed on a per-unit basis without using standard costs. The control is then carried out by comparing the costs of successive months.

The accompanying report focusses attention on the control of manufacturing costs. It assists in the control of costs by indicating that there have been unfavorable variances in fixed and variable overhead. This report should be backed up by supplementary reports showing the specific areas where the excessive spending occurred. Note that this report shows that something is wrong, but it does not show specifically what is wrong. This task is reserved for other reports.

Divisional Income Statements. The desire for decentralization has led many large corporations to divisionalize. This in turn has led to the need of measuring the performance of the various divisions. Thus the accounting entity becomes the division instead of the corporation. The problems of accounting for segments of a corporation are more complex however than the accounting for a corporate entity. One problem is the pricing of the sale of products among divisions. In accounting for a corporation, the price is part of a legal contract and relatively easy to determine. With intra-company transfers the price is often arbitrarily determined by management. Since the price of product will determine the total revenue, the income is to a great extent determined even before production is commenced. Thus the *actual efficiency* will influence the *measure of efficiency* only to a limited extent.

Even where intra-company transfers and pricing are not a problem, there still exists the problem of the allocation of costs between the divisions. These may be headquarters (central office) costs that have to be allocated to the operating divisions, or the costs of one division performing services (such as accounting or transportation) for the other divisions. There results arbitrary allocations which are not necessarily harmful but which unfortunately often become harmful because they form the basis of reports for which they were never intended. These costs are frequently joint costs incapable of clear-cut allocations.

The allocation of costs among divisions and the allocation of central office overhead are useful for determining the cost of inventory (work in process and finished goods). They also indicate to the operating divisions the total costs that have to be recovered by the division in order for the company to be heading for a profitable operation.

The allocation of these costs is not useful for purposes of controlling costs nor is it useful in pin-pointing the income of the division. The allocation of the costs is too arbitrary and too subject to complaint, so that it does not accomplish these goals. When divisional income reports include these allocations in detail, there is a tendency for the divisional management to focus attention on these items and to place the blame on them for decreases in income. It is not hard for a person to take exception to the basis of allocation of joint costs. The following report is an example of the type of report that leads to this misuse of management time:

THE DETROIT DIVISION OF THE SAMPLE COMPANY

INCOME STATEMENT FOR THE MONTH
ENDING JUNE 30, 19–

Sales Revenues			$50,000
Less			
Manufacturing Costs (standard costs of product)		$40,000	
Unfavorable Variances from Standard Costs		1,500	
Selling Costs		4,000	
Allocations from Central Office			
Personnel Department	$300		
Production Department	700		
Finance Department	400		
President's Office	600		
Purchasing Department	500	2,500	48,000
Income of Division			$ 2,000

There are several weaknesses in the preceding statement. There is only one income figure, and this is reported after the allocations from central office. The efficiency of the division manager is being measured by the income of $2,000, even though this figure is affected by the $2,500 of costs which he cannot control. Also, the income statement devotes more space to the irrelevant allocations than to the remainder of the costs. A more significant income statement would be as follows:

THE DETROIT DIVISION OF THE SAMPLE COMPANY

INCOME STATEMENT FOR THE MONTH
ENDING JUNE 30, 19–

Revenues		$50,000
Less		
Manufacturing Costs (standard costs of product)	$40,000	
Unfavorable Variances from Standard Costs	1,500	
Selling Costs	4,000	
Total Divisional Costs (controllable by division)		45,500
Contribution of Division		$ 4,500
Less Allocation of Central Office Costs		2,500
Net Income of Division		$ 2,000

This second income statement highlights the contribution of the division, since for many purposes this $4,500 would be the significant figure, not the $2,000. The allocations from the central office are played down by combining them into one figure.

Neither of the income statements distinguishes between fixed and variable costs. Frequently it will be desirable to compute the contribution of the division in terms of the difference between revenues and variable costs.

Reporting Costs by Divisions. The same criticisms made relative to the divisional income statements also apply to the cost reports. These are too frequently cluttered up with costs that the division (or smaller operating unit) cannot control. This is especially true where the allocations are the results of arbitrary allocations.

In some cases allocations of costs may have significance. The prime example of this is repair costs. Repair costs can be controlled by the repair shop foreman who sees that jobs are done quickly in an efficient manner. They can also be controlled, in a sense, by the operating departments, which properly maintain the machines so that the need for repairs is reduced. With costs of this nature, the allocation (when based on actual jobs worked) does have significance, since the costs are to some extent controllable by the operating personnel.

A cost report should highlight those costs which are truly controllable. Other costs should be combined and presented as noncontrollable costs. This will allow the manager to focus attention on those areas which he can control. The report should also be so designed that those areas requiring attention will be highlighted and thus bring *exceptions* to management's attention.

Value of Historical Reports for Control Purposes. Some students of management state that accounting reports are not useful for control purposes because they come out after the event has already happened. They say that what they want are reports which show what will happen in the future if certain action is taken. If the reports indicate that the action is not desirable, then it can be changed before the event has taken place. Reporting what has happened is no help, since it is too late to avoid the errors.

These people are not entirely wrong, but there is enough error in their supposition to be worthy of comment. The request for reports to indicate the probable results of different actions is justifiable, and the accountant should fulfill this request. But this does not negate the usefulness of historical information. Since foremen and other supervisors know that the historical reports will come out sooner or later and that they will be criticized or praised on the basis of these reports, they have some motivation to do a good job. The effectiveness of the motivation will depend both on the timeliness of the reports and how well management uses the reports to help enforce a high level of efficiency.

It is interesting to construct a situation where historical reports have been eliminated and entirely replaced by forecast reports. The supervisors would soon find out that their actual performance was not being measured and that they would have to worry only about presenting a rosy picture for the future. Obviously this would not lead to a satisfactory control system. It is necessary to measure the results of the past to encourage efficiency in the future.

Timing of Reports. Frequently reports are prepared and distributed too late for them to be as useful as they might be. A classic example of bad timing is the corporation which cut off material requisitions on the twelfth day of the month and then distributed the financial reports more than 30 days after the end of the month. Thus, to prepare the report for June, the material requisitions had to be cut off on the twelfth of June, but the financial reports were not prepared until sometime after the first of August. In the meanwhile management worried about the current problems in August as well as the problems of July until the report for June was distributed. Could the management really use the report when it came out? It is surely better to get a report a month late than not at all, but how much better? Obviously the report that is a month late loses much of its usefulness.

The reader may well wonder why it takes over a month to prepare a financial report. He may think the problem to be inefficiency or lack of modern equipment. In the case being discussed, the company had access to the latest in accounting equipment, including electronic data-processing equipment. Why were the reports so late? One reason is the size and complexity of the information. Inventories consist of thousands of items, there are eighty thousand workers, and purchase invoices number in the hundreds of thousands. The second reason is equally important. The information is checked and rechecked for accuracy. Thus the accounting machine prepares a run (a printed report) which is then verified, and adjustments (refinements) are made. This all takes time.

How can we expedite the preparation of the report? There is no simple answer to this problem, and the answer will vary from firm to firm. Several general procedures can be suggested, however.

1. Material requisitions and invoices can be cut off several days prior to the end of the month.
2. Refinements to the data can be postponed to the following month.
3. The number of "checks" to prevent errors can be reduced and the possibility of errors increased, if the errors are not material.

4. Careful scheduling of the accounting machines and judicious use of overtime can decrease the "flow" time of the reports as they are being processed.

Some accountants, accustomed to penny accuracy and numerous checks to catch errors, will often tend to resist the foregoing suggestions. It is important for them to realize that the penny accuracy is a fiction, especially when we are talking about managerial decisions revolving around the size and use of inventories (where the choice of inventory flow procedure will affect the figures to the extent of millions of dollars), or about the depreciation charge (which is so greatly affected by the choice of depreciation procedure and the year of purchase). There are many other examples of rough estimates. Reasonableness and usefulness must be the guiding principles for reports prepared for managerial purposes, and the impact on the timing of the report must be taken into consideration before incorporating refinements into the data-gathering system.

Special Reports. In an examination a student once criticized accounting for failing to classify costs as relevant or irrelevant. This seems to be plain common sense and a valid criticism, until we think over the implication. Can the accountant classify costs as to whether or not they are relevant? Unfortunately he cannot because the specific decision which is being made must be known before the costs can be classified.

If the production of a plant can be sold for *X* dollars, then the desirability of producing and selling can be determined by a differential cost analysis (the revenues to be earned minus the additional costs which would be incurred because of the production). All fixed costs (costs that will be incurred in any event) should be excluded from consideration. But if there is a possibility of selling the plant, then the analysis should include different costs, since certain "fixed costs" can be avoided by the sale of the plant (the plant manager's salary, accounting cost, etc.). This illustrates the fact that special reports will be needed to make special decisions. The routine accounting report cannot and should not be expected to answer all needs. When special information is needed, then special reports resulting from special studies should be prepared.

The danger of regularizing special reports should be avoided. Once a report starts, it is very difficult to get complete agreement that it should be discontinued. Someone can always remember the time that he used the report. Another difficulty is the fact that one or more employees start considering that report as their sole job. They develop a vested interest in the report and will defend it with all the vigor with which a lioness will defend her cubs.

Summary. It is not unusual for the pounds of paper consumed during a manufacturing period to be in excess of the weight of the product being made (a major airplane company checked this out and found it was true in their case). In this age of scientific management, stress is laid on getting useful information. Unfortunately this stress often has the undesirable by-product effect of developing unnecessary reports.

The quantity and quality of reports should be strictly controlled. This can be done by an organization currently existing, by a separate report group, or by special consultants. It is incorrect to assume that the reporting is being done correctly just because it is being done in the same manner it was done ten years ago and "We were profitable then." A thoughtful executive once said at a cost control meeting, "Maybe we should review everything we are doing, and if we are doing it in the same manner as we were doing it five years ago we should change." The speaker was aware that many things being done today were being done correctly, even if they were being done in the same manner as they were done five years ago. He was also aware that paralysis had begun in many segments of the organization and that the prevailing feeling was "If it was done this way in the past, it should be done this way now." Report preparation is one area especially susceptible to this paralysis. Seek out a business manager and ask him how he uses the reports which cross his desk. You will find that he uses very few of them. Ask him if he would approve of certain reports being discontinued; you will find that he is reluctant to do away with anything he is currently receiving. The result is that corporations spend millions of dollars for preparing reports which are not used and also millions for preparing reports which should not be used.

The only solution seems to be a hard-hitting organization that can control and review the reports being prepared. The problem still remains of what happens when an executive requests a report that he should not have. This is a political question which has to be resolved by taking into consideration the personalities involved.

QUESTIONS AND PROBLEMS

32–1. The United States Airplane Company

The United States Airplane Company was divisionalized in the spring of 1956. As part of a general program to control costs, a "Divisional Overhead Statement" was prepared monthly. The report was prepared by the cost accounting section of the central office, and the goal was to distribute it fifteen days after the end of the month to all top management of the divisions and headquarters (including the president of the firm). The March report was dated June 27, 1957.

The company had wrestled with the problem of allocation of mutual support costs (costs incurred by one division in servicing other divisions). Usually these costs were of a joint cost nature and could not be directly identified with a specific division. For example, one division might be doing the payroll for another division, using the same personnel, buildings, and machines that it used to do its own payroll. The company finally decided that while it would be feasible to allocate these costs, using many different bases, it would also be expensive. To avoid this expense, one base (direct-labor hours) was chosen as the basis of allocation of all mutual support costs and the costs of the central office.

Indirect manpower is also controlled using a ratio of indirect workers to direct workers (see Schedule III).

The fact that the report was making an impression was borne out when several divisional executives called the cost accounting section which prepared the report and challenged the amount of various costs they were being charged. The divisional overhead statement was also the basis of a report that showed in detail the extent to which the various divisions had been divisionalized.

In order to obtain the information presented in Schedules II and III, each individual cost which was incurred in servicing other divisions was multiplied by the approprate allocation percentages. This information was also distributed to the divisions for cost control purposes.

Required

(a) Write a critique of the reports as presented. How can these reports be used?
(b) How would you revise the reports?
(c) Comment on the use of direct-labor hours as the basis of allocation.

Schedule I

UNITED STATES AIRPLANE COMPANY

DIVISIONAL OVERHEAD RATES

(Per Direct-Labor Hour)

Year to Date: 1957	*Los Angeles*	*Detroit*	*Chicago*
Jan.	$3.80	$4.71	$4.55
Feb.	3.82	4.75	4.51
Mar.	3.82	4.75	4.46
Month 1957			
Jan.	$3.80	$4.71	$4.55
Feb.	3.85	4.78	4.44
Mar.	3.82	4.76	4.43

Schedule II

UNITED STATES AIRPLANE COMPANY
STATEMENT OF OVERHEAD EXPENSES APPLICABLE DIRECT LABOR FOR THE MONTH OF MARCH, 1957
(Dollars in Thousands)

	Los Angeles		Detroit		Chicago	
	Dollars	Rate per Hour	Dol-lars	Rate per Hour	Dollars	Rate per Hour
Straight Distribution						
Salaries and Wages	$ 4,688	$	$136	$	$ 696	$
Costs Closely Related to:						
Indirect Salaries and Wages	860		24		118	
Wages	1,471		38		163	
Direct Salaries and						
Total	$ 7,019	2.02	$198	2.64	$ 977	2.73
Mutual Support						
Salaries and Wages						
Headquarters	$ 85		$ 2		$ 9	
Los Angeles	2,325		71		226	
Chicago	186		3		15	
Total	$ 2,596		$ 76		$ 250	
Costs Closely Related to Salaries and Wages	473		14		45	
Total	$ 3,069	0.88	$ 90	1.20	$ 295	0.82
Allocable Expenses						
Supplies, Ins., Tax, Deprec., etc.	$ 2,801		$ 60		$ 276	
General Research	409		9		42	
Total	$ 3,210	0.92	$ 69	0.92	$ 318	0.88
Manufacturing Overhead to Work-in Process	$13,298	$3.82	$357	$4.76	$1,590	$4.43

Schedule III

UNITED STATES AIRPLANE COMPANY

SUMMARY OF DIRECT AND INDIRECT MANPOWER

NUMBER OF WORKERS AS OF MARCH 15, 1957

	Los Angeles	*Detroit*	*Chicago*
Exclusive Support of Own Division	8,141	249	1,306
Mutual Support			
Headquarters	132	3	20
Los Angeles	4,038	196	561
Chicago	466	8	41
Total Indirect	12,777	456	1,928
Total Direct	17,696	454	1,842
Per Cent of Indirect to Direct	72.20%	100.44%	104.67%

32–2. The following report is submitted monthly to the plant manager of the Chicago plant of the Hammond Corporation:

CHICAGO PLANT

DEPARTMENT MANAGER: J.M. Jones DEPARTMENT: Operating 1

Account Number	Account Title	Budgeted Cost for 300,000 Direct-Labor Dollars	Actual Cost Incurred	Cost Variance
54–78	Direct Labor	$300,000	$180,000	$120,000
64–56	Indirect Labor (fixed)	20,000	21,000	(1,000)
54–82	Indirect Labor (variable)	30,000	19,000	11,000
65–21	Supplies (fixed)	8,000	8,500	(500)
55–21	Supplies (variable)	6,000	4,600	1,400
44–22	Allocation from Production Control	2,100	2,500	(400)
44–23	Allocation from Accounting Dept.	4,000	4,200	(200)

Required

(a) Comment critically on the above report.

(b) Prepare a revised report.

(c) Is there any additional information you would want to know?

32–3. In preparing reports for the control of costs, it is desirable to include only those costs which are controllable. It is also necessary to determine how costs react to changes in activity.

Required

(a) Name some costs that may be incurred in, or allocated to, a department (or plant) which are not controllable by the man in charge.
(b) Name several costs that are clearly fixed or variable in nature. Name several costs that may vary but not with the level of production.
(c) Explain what is meant by a variable selling cost.

32–4. The Bright Automobile Company has a centralized training program for many skills that are common to all divisions. The training group, as are all departments of the company, is very cost conscious. To help control costs, the training group prepares a monthly report showing for each division the "cost of training" for the month. This cost of training is broken down by course, and shows the hours of trainee time spent in each course as well as the dollar cost.

The training cost is computed by multiplying the hours each trainee spends in training by his hourly rate of pay.

The training group, in its description of the report and its use, states that "The function of this report is to assist divisions and departments in the control of their training costs."

The cost of preparing the report is estimated at $15,000 per year. Several divisional managers have expressed interest in the report and have made inquiries to the cost control group as to whether or not training costs can be decreased.

The divisions of the Bright Automobile Company follow a policy of mutual support. This means that skilled employees of one division may be transferred to another division if the transfer is thought to benefit the company as a whole.

Required: Discuss pros and cons of continuing the present report.

33

Procedures for Recording Costs: Internal Control

EVERY ACCOUNTING department should standardize the procedures for recording financial transactions. These procedures should be in writing in order to minimize misunderstandings. Transactions should be recorded to conform to generally accepted accounting principles and in a manner to maximize internal control.

Internal Control. Recording procedures should be designed to ensure accuracy and efficiency at the lowest cost, but also the system should be designed to conform to the best principles of "Internal Control." Internal control refers to the organizational and operational procedures that are designed to *safeguard the assets of a firm by controlling costs, preventing fraud, and detecting errors.* It is possible that the objectives of recording transactions cheaply and conforming to good practices of internal control may not appear compatible. The objectives may be reconciled by the inclusion of the hidden costs associated with bad practices arising from the failure to maintain good internal control. By ignoring the requirements of good internal control, it may appear that the firm is economizing, but the saving may actually be dissipated by the theft of cash and inventory, or by innocent errors which have to be found and corrected but which could have been prevented or found sooner with good internal control.

What elements are necessary for a good system of internal control? There are essentially two items (1) automatic safeguards which accompany a well-installed accounting system, and (2) a state of mental awareness of the necessity for good internal control. The first item is primarily a matter of having an expert install a good accounting system. The mental awareness may be developed through education and training, but it is to a great extent contingent on the hiring of qualified personnel.

Among the more important principles of internal control are:

1. The accounting department must be independent of the operating or manufacturing departments.
2. The recording and custodian functions must be separated (for example, the handling and recording of cash will be performed by different personnel).
3. Transactions should not generally be recorded entirely by one person (for example, one persons should record the accounts receivable control account and another should record the accounts receivable subsidiary or detailed ledger).
4. Work must be adequately supervised and must be performed by *qualified* personnel.
5. The system of recording transactions must be in writing, and periodic reviews must be made to ensure that the system as prescribed is actually being used.
6. Reviews (audits) must be made to ensure that data has been correctly recorded.

For various types of transactions (such as handling payments of accounts payable or receipt of cash from customers), comprehensive lists of the requirements of a good system of internal control have been prepared. The American Institute of Certified Public Accountants has published several publications dealing with internal control, including case studies on auditing and case studies on internal control. It is not necessary that we have at our fingertips the various detailed requirements for a good system of internal control. It is important for the reader to realize that theft, fraud, and errors are possible and that systems have been devised to minimize the possibility of these events happening undetected. Descriptions of these systems can be obtained by consulting publications of the American Institute of Certified Public Accountants or other appropriate publications.

A Case Study—The Niles Plant

The remainder of this chapter is concerned with a case study of the operating procedures for recording selected financial transactions of a manufacturing plant. The plant studied is assumed to be one of seven plants in the Parts Division of a large corporation. The plant being described is a composite of several plants.

Organization. The controller of the Niles plant is directly responsible to the divisional controller of the Parts Division. The plant manager relies on the plant controller for information but has no authority over the controller. If he were not receiving adequate information, he could report this fact to the vice-president in charge of the division.

The divisional controller has one auditor who makes periodic audits of the accounting department of each of the seven plants. The auditor's written instructions direct him to audit the accuracy of the financial information being recorded. They also direct him to investigate compliance with operating procedures relative to the recording of financial transactions and the handling of the various "business paper" connected with financial transactions. The plant is audited annually by the company auditing staff and approximately every three years by independent public accountants.

The divisional controller also has a staff of three men concerned with budget systems, cost control and cost review, and the cost accounting system. These men try to find new methods to improve the reporting and to maintain a high level of general and theoretical accuracy in the reporting by the plants in the division. They are responsible for seeing that directives from the central office are carried out in an expeditious manner.

In addition to the above divisional personnel, the central office of the company has an audit staff, cost accounting staff, and a cost control staff. The functions of these staffs are very similar to the functions of the staff personnel at the divisional level. In general they attempt to ensure a high level of reporting of financial information throughout the company. They aim toward uniformity, but they recognize that there are differences among various divisions and plants which require differences in accounting systems. Nevertheless the company does publish a standard accounting manual (which the plants and divisions are expected to follow or explain the reason for diverging from it) and standard operating instructions relative to the taking and pricing of inventories, etc.

The central office staff is encouraged to get out in the field, and they make an attempt to get to know plant personnel and encourage an informal relationship. The plant personnel are encouraged to think of the central office accounting department as a source of information and assistance rather than a police force. To a great extent they are successful in promulgating this feeling, but the plant personnel suspect that the people from central office have considerable control over their future. There is some justification for this suspicion, since an unco-operative plant controller may find his career taking two steps backward if a notation is sent "upstairs" reporting that he has ignored suggestions from central office.

Comments

The organizational set-up of the company and division is excellent. The plant controller receives assistance from both the divisional and company level. There is a danger that the divisional auditor will get in a rut in his audits of the seven plants of the division. If possible the man holding this position should be rotated to another job within the corporation after a few years. The possible dangers of this man becoming stale are relieved somewhat by the fact that the plants are audited annually by the company auditors.

Questions

1. Should the plant controller be under the authority of plant manager? Explain.
2. Why is it desirable that each division have its own staff personnel (auditors, systems, etc.)?
3. In some companies there is a feeling that central office staff personnel are a luxury that can be afforded during prosperity but during periods of business recession is a spot where savings can be made. Discuss the validity of this point of view. Could the company save money by eliminating the central office audit staff, etc., in the case being studied?
4. The independent public accountant annually issues an opinion as to the fairness of financial position of the automobile company being discussed. Do you think that they can do this without actually visiting the Niles Plant annually? Explain.

Organization of Plant Accounting Department—A Case Study. The controller of the Niles plant has three supervisors assisting him:

General Accountant: In charge of the general ledger and payroll department.
Factory Accountant: In charge of the recording of costs incurred and the maintenance of inventory records.
Financial Analyst: This title is somewhat misleading. This man is in charge of investigating the reasons for differences between actual and standard (or budgeted) cost.

Though the accounts payable and payrolls are paid by the divisional office, the information necessary for the preparation of the checks is a responsibility of the plant. All accounting for fixed assets, including the accounting for construction in process, is accomplished at the plant.

The accounting department relies heavily on the production control department and the manufacturing engineering department. These two departments supply technical information which is needed by the accounting department in order to carry out its responsibilities.

Recording Procedures for Material—A Case Study. Raw material receipts are recorded when purchased in a raw material control account at actual invoice cost. Individual cards, for each type of raw material, are maintained by the accounting department. These cards show the quantities, standard unit prices, and actual dollar amounts paid for the material. The source for the entry to the cards and to the raw material account in the general ledger is a machine run (a typed list of purchases) which is prepared from the matched receiving reports and vendors' invoices. At the end of the month the difference between the actual amount paid and the standard cost of the material is computed and closed to a price variance account. The inventory cards are reconciled monthly to the raw material control account.

Transfers from the raw material account to work in process are made on the basis of a material disbursement sheet. The disbursement sheet, a summary of daily disbursements of material, is obtained from the production control department. A lift-tag procedure is used as the basis for this report. The lift-tag procedure more or less ensures that all material placed into production is reported. When a foreman places a bundle of steel plate into production he removes an identifying tag which is sent to the production control department. This tag is the basis for the report of material disbursed (or used). If the foreman neglects to remove the tag or the tag is lost, then a periodic inventory will disclose that the bundle of inventory, for which a lift-tag stub is on file in the raw material inventory file, is no longer in inventory. This will require an inventory adjustment and will give rise to considerable snarls from several levels of management. To ensure that all lift tags are removed when raw material is placed into production, a representative of the production control department will usually try to be present when raw material is requisitioned for production. This is not always possible, since the material is stored in an open location and foremen occasionally bypass red tape and place the material into production without notifying the production control representative.

The debits to work in process are made at standard prices for material. Detailed inventory cards are maintained, showing balances, receipts, scrap, and shipments. No finished goods accounts are maintained. When the product is finished, it remains in the work-in-process account until it is shipped, at which time it is transferred to cost of goods sold.

The material is charged to cost of sales at a full standard (standard price and standard usage). The transfer is based on a summary of shipping reports. These shipping reports are summarized mechanically and the units of each type of product shipped are multiplied by a standard "rough weight" (weight of raw material necessary to make the end product) to find the amount of material in work in process which should be transferred to cost of goods sold. The difference between the monthly physical inventory of raw material in process and book inventory is charged to a material usage variance account.

From the foregoing discussion it is obvious that accounting must know how much raw material should be going into each end product. Where is this information obtained? The manufacturing engineering department supplies the specifications (material and labor to be used) and bill of materials (list of component parts). Changes will be made periodically in the specifications, and it is necessary that the accounting department be informed immediately. For this reason manufacturing engineering sends advance notice of changes in material to be used or other changes in the bill of material or specifications. Accounting makes a complete check every three months with the manufacturing engineering department of the specifications and bill of materials it is using.

The specifications are not checked against shop usage by the accounting department, but manufacturing engineering does check them every two weeks.

The production control department also keeps detailed inventory records for raw material. The accounting department reconciles its records monthly with the production control department records. The production control department's records are maintained only in physical units, and it does not maintain detailed inventory cards for raw material in work in process. They argue that the summary of the monthly physical inventory is actually all the record of work in process that they need. This physical inventory of work in process is made by production control, and it is the basis of the entry adjusting the raw material in work in process (closing out the material usage variance).

The financial analysis section conducts detailed investigations into the cause of material price variances. Specific purchase orders and vendors' invoices are reviewed in detail to determine reasons for the variances. Usage variances are investigated by first checking the material specifications. If the metal being used is 0.001 inch thicker than the specification used for costing purposes, this will result in a significant usage variance. Scrap reporting is also reviewed, as is the inventory taking. If the inventory of work in process is incorrectly taken, this may well result in a usage variance.

All raw material is supposed to be used within six months after purchase. To implement this rule, the rotation of raw material is controlled by the means of the lift-tag file. Actually, some of the stock is over six months old, since foremen have a tendency to use the metal at the top of the pile. In most cases this is not a harmful practice,, but there are several types of metal whose physical characteristics change with time and these should be used during the six-month period.

The raw material inventory consists of approximately 150 different categories. The raw material and work in process are both inventoried monthly by production control. Completed products are counted both mechanically and manually. At the end of the month the production count is checked against the production indicated by the physical inventory and shipping record. In the past this check has indicated that the production counts are not accurate. The foremen's counts tend to be optimistic, and the mechanical counter has fallen before man's ingenuity to "beat the system."

Comments

Raw material is recorded on individual cards by type of raw material. The question may be raised as to whether it is necessary to record the actual dollar amounts paid for the material on the inventory cards. In fact the inventory cards could be kept by using physical quantities only. Dollar amounts could be found by multiplying the physical units by the standard cost per unit. Is there any reason why the raw material could not be recorded into the general ledger, using standard costs instead of waiting until the end of the month to determine the standard cost and price variance?

The lift-tag procedure used is reasonable. To be workable, it requires the complete co-operation of the foreman. The foremen should be educated as to the function of the system and the necessity for their cooperation.

If possible, better storage facilities should be developed so that more control could be exercised over raw material.

The product specifications are not checked against shop usage by the accounting department. This is permissible if there are good communications between the accounting and manufacturing engineering (as there seem to be), and if the manufacturing engineering department is efficiently run. The case does not state how accounting is to know whether it has received all changes of specifications. Are the changes serially numbered? They should be, and accounting should check more frequently than every three months to see that it has all the changes.

Since the production control department maintains detailed inventory records for raw material, the accounting department could consider dispensing with its detailed records of receipts and disbursements of raw material.

Questions

1. What factors may cause a material price variance?
2. What factors may cause a material usage variance?
3. If the production counts are not accurate, why bother making them?
4. In recording material, accounting relies on several reports not prepared by the accounting department. Discuss the nature of the reports and the possibility of errors being incorporated into the records.

Recording Procedures for Supplies—A Case Study. The cost accounting department does not keep any detailed inventory records for supplies (these are frequently called nonproductive materials). Production control keeps detailed records of quantities and latest purchase order prices. Requisitions are priced by production control. The cost department extends the prices and summarizes the information from the requisitions for the journal entry transferring the requisitioned supplies to manufacturing overhead.

Seventy per cent of the supplies purchased are expensed when purchased rather than when used. There is no specific divisional policy as to what items should be carried in inventory and what items should be expensed when purchased. As a result there are wide differences of procedures followed. One plant in the division inventories all supplies, and another plant expenses all supplies when purchased.

Inventory record cards are maintained by production control for each supply item, including items expensed as received. The cards show quantity only, though the latest purchase order price is noted on the card.

Charges based on actual invoice price are made to the supply account. As stated before, the latest purchase order price is used to relieve these inventory accounts. These prices are checked monthly by accounting to ensure that they are current.

All stock withdrawals are covered by requisitions. The requisitions for non-inventoriable items are not the basis for an accounting entry because these items have been already expensed. The men in charge of the inventory cribs have a file of cards with the signature of personnel authorized to requisition material. These files are primarily to please the auditor and are rarely used by the crib attendants, who rely on the fact that they have talking acquaintance with the foremen and know who can requisition supplies. Foremen often send direct-labor workers to requisition their supplies.

Obsolete and excess inventory are listed, and lists are sent to production control (forwarded to manufacturing engineering). The cost department sets up a 100% reserve for the cost of the supplies which are obsolete and excess. Production control is responsible for seeing that the supplies of this nature are disposed of in a reasonable period of time.

Each item in inventory is counted four times a year by the production control department. Explanations for differences between the physical count and the quantity indicated by the book inventory are supplied by production control. These explanations tend to become routinized because it is almost impossible to explain the difference without a detailed audit of receipts and requisitions (and this would only explain the discrepancy if an honest error has been made).

Each month an item by item analysis is made of supplies used during the month. This summary is made out by department so that each head of department can check with supplies his department is using.

Comments

The practice of expensing supplies when purchased should be discouraged. All plants should use the same procedure. Expensing supplies as they are received results in their being charged as a cost of product (and affecting various measures of efficiency) in a period when they may merely be sitting on a shelf; when they are used, no charge is made to cost of product.

The use of latest purchase order price to price supplies used is reasonable because it reduces much paper work which arises when some of the other inventory procedures (such as LIFO or FIFO) are used.

The procedure for requisitioning supplies should be tightened so that only authorized personnel may draw supplies.

Questions

1. If latest purchase order prices are used to relieve the supplies inventory, how should the ending inventory be adjusted? Explain.
2. Production control personnel count supplies four times a year. Do you believe the accounting department should make any counts?
3. Discuss the effects of expensing supplies when purchased on financial reports.
4. Discuss the procedure for setting up the "reserve" for obsolete and excess inventory.

Recording Procedures for Labor—A Case Study. There are six operating or productive departments in the Niles Plant. For each department the total direct-labor pay for the month is divided by the total hours worked during the month to obtain an average incurred cost per direct-labor hour. The average labor cost incurred is used to value the end-of-the-month in-process inventory.

The direct-labor hours are accumulated by the foremen on time sheets. The timekeepers daily summarize the foremen's time sheets and check the total hours worked according to the department in which the work was incurred. The time cards are sent to the payroll department, as is the summary of hours worked by department. The payroll department sample checks the extensions of the time cards and prepares a payroll distribution. This classifies the total payroll for the period according to the department in which the cost was incurred. Thus we have the hours worked and the labor cost of the individual operating departments. The labor cost per hour of labor can be readily computed. It is the labor rate that is used to value the ending work in process inventory. The labor rate as computed excludes all wage premiums.

The actual hours worked are obtained from the summaries just explained. The standard number of hours of production is obtained by using the following procedure:

Add: Standard Hours Shipped
Standard Hours in Process at the End of the Period
Standard Hours of Labor in Scrapped Material
Subtract: Standard Hours in Process at the Beginning of the Period
To Obtain: Standard Hours of Production

The standard hours are obtained in the following manner:

Standard Hours Shipped: The parts shipped are multiplied by the current work standard applicable to that part.

Standard Hours in Process: An estimate of standard hours in process is made by the takers of the inventory (units between pay points are assumed 50% completed). This is added to the standard hours obtained by extending the units in process which are completed by the applicable current work standard.

Standard Hours of Labor in Scrapped Material: The standard hours are computed for the amount of labor performed prior to the last inspection (which the product passed). Credit is also given for labor performed since that point to the point of scrapping.

The direct labor to be charged to cost of goods sold is obtained by adding the direct labor in process at the beginning of the period to the actual direct labor payroll and subtracting the standard direct labor in process at the end of the month (computed as indicated above).

The standard hours of production for the month are computed as indicated above. Every working day each shift foreman turns in a report of production for his shift, and these reports are extended to obtain standard hours of production. The standard hours of production from the two sources are compared at the end of the month. If a variance exists (one usually does), the reason for the variance is investigated, and an attempt is made to eliminate future variances.

If the labor rate per standard hour changes from month to month, the variances are analyzed if they are significant. Small changes are not investigated.

The payroll department conducts two payroll checks per year. As the men are paid, their badges are checked by a member of the payroll department. The divisional auditor attempts to conduct one line check per year, i.e., check the time cards punched in for the day against the foreman's time sheet and against the men actually on the production line. It is hoped that these procedures will reduce the number of "dead men" being paid.

Comments

The explanation of labor reporting describes a procedure that caused the Niles plant to actually show better profits in a month in which labor inefficiencies were up. This resulted from the following computations, combined with large ending inventories (which occurred at the end of a model year as the plant built up inventories for the new models).

$$\text{Average labor cost} = \frac{\text{total direct labor costs for month}}{\text{total hours worked during month}}$$

Ending work in process inventory = average labor cost × standard hours in process

Charge to cost of goods sold = beginning inventory + actual payroll − the ending inventory

If the labor costs for the month are *high,* the average cost for the month is *high,* and the ending work in process inventory is *high,* then the charge to cost of goods sold will be *low.*

Questions

1. The comments suggest that the procedure followed in costing labor is incorrect. Suggest a procedure that will be more useful.
2. Do the standard hours of production require accurate production counts? Explain. What are the possible causes of error?

Recording Procedures for Overhead—A Case Study. The Niles plant has 30 burden centers. This means that indirect manufacturing costs are accumulated and classified so that they may be identified with 30 different responsibility centers. The 6 operating departments are actually divided into 14 burden centers. The other 16 burden centers are nonproductive or service functions.

The service departments are allocated to the operating departments, using various bases. Among these are:

Service Functions	*Basis of Allocation of Monthly Cost*
Controller's Office	Headcount (Number of Employees)
Quality Control	Budgeted Direct Labor
Plant Engineering (building costs)	Budgeted Direct Labor
Tool Room	Services Rendered
Utility Cost (steam, water, and electricity)	Fixed percentages based on combined factors of headcount, area, and connected horsepower

Each month the actual overhead charges are distributed to the applicable productive or operating departments. This actual manufacturing cost incurred is compared with the amount of overhead absorbed by the department using the normal burden absorption rates. The over- or underabsorbed burden is then spread to unit product cost of goods sold on the basis of the standard hours shipped, where the department is making more than one product (when only one product is made there is no need for allocation).

The normal burden absorption rate is applied to direct-labor dollars actually incurred in order to find the amount of burden transferred to work in process. To relieve the in-process account of the burden portion of cost of sales, the following formula is used:

Burden in cost of goods sold = burden rate × labor costing rate × standard hours shipped

This formula may be expressed as follows:

Burden in cost of goods sold = burden rate × direct-labor dollars in goods sold

The normal burden absorption rate is computed annually by the cost analysis section. The budgeted overhead for each department is divided by the budgeted direct-labor dollars. Both the overhead and direct labor is budgeted for a predetermined *normal level* of activity. The burden rate, once computed, is not changed because of changes in specifications, labor rates, etc. Only major operational changes that would drastically change the budget would result in changes in the burden absorption rate.

Comments

Allocation of common costs is at best a difficult problem. The basis of allocation should, however, bear some relationship to the benefit received from the cost. This does not seem to be valid for several of the service departments illustrated.

The spreading of over- or underabsorbed overhead to unit product cost on the basis of the standard hours shipped is not a reasonable procedure. The portion of this variance, which arises because of idleness, should not burden the product which was manufactured. It is a cost of not making any product, i.e., being idle.

Questions

1. Comment on the basis of allocation for each of the service functions illustrated.
2. Why is it not reasonable for under- or overabsorbed overhead to be allocated to unit product cost on the basis of standard hours shipped?
3. Why are burden rates not changed during the budget year except for major changes in operations? What would be some operational changes that would require changes in the burden rate?

Summary. This chapter contains only a very brief description of internal control and the recording procedures. Many areas of importance were slighted in a desire to highlight a sampling of some of the more important aspects of the recording process. Other areas that could have received attention are:

Handling and Recording of Work Orders (a job cost system)
Receiving and Shipping Procedures

Scrap Handling and Reporting System (including both material and machine scrap)
Setting of Standards by Manufacturing Engineering
Control of Inventory and Production by Production Control
Analysis of Costs by the Cost Analysis Section
Procedure Used in Taking Inventory
Recording of By-products

The procedures followed by the Niles plant are not perfect; in fact there are several glaring faults. The point that should be impressed on the reader's mind is not the specific procedures followed but that accounting consists of more than merely recording some cut and dried figures. The information recorded by the accountant is supplied to him from many different sources. These sources are of varying degrees of reliability. It is up to the accountant to check his sources of information, and ensure that the information flowing to him is as good as can be obtained. This requires that the accountant frequently leave his office and see what is going on in the plant. He should be familiar with the methods used to receive material as it comes in, the process used to store it, and the methods of production. Nothing can be taken for granted. A physical inventory is a useful thing and should be used frequently to confirm the accuracy of the records, but a physical inventory is no better than the man taking it. The Niles plant actually took frequent enough inventories, but a check by the company auditors revealed that the inventory takers were frequently not actually taking an inventory but were merely guessing at the amounts of work in process. Their accuracy was good, considering the method used, but totally useless for the purposes for which it was being taken. This situation could have been avoided by periodic checks by the accounting department of the procedures used by production control inventory takers. The accountant must be constantly investigating and reviewing so that management can use with a fair degree of confidence the information and reports turned out by the accounting department.

QUESTIONS AND PROBLEMS

33–1. List four procedures found in the case of the Nile plant which were designed to directly or indirectly strengthen the internal control. Explain briefly how each procedure accomplished its function.

33–2. Scrap reporting is not described in the chapter. What would be the major objectives of a good scrap accounting system?

33–3. Instead of using a process cost system, do you think the Niles plant should be using a job cost system? Explain.

33–4. Is the system of cost accounting used by the Niles plant a standard cost system? Explain.

34

Capital Budgeting

THE TERM *capital budgeting* refers to systematic procedures used to allocate funds available for investment so that the income objectives of the firm will be realized. Which of various long-lived assets will be most profitable and thus most deserving of investment? The problem arises because resources are scarce; thus a firm will invest in selected projects which best fit into the income objectives of the firm (a firm may attempt to minimize losses rather than maximize profits).

The decision relative to directing the flow of investment resources is one of the most important decisions which management makes. Once the funds have been sunk into the long-lived assets, the firm is committed to operating the assets. It is a relatively unusual situation when a firm can sell off a long-lived asset at anything except a loss. If the correct investment decision is made, then the firm is in a good competitive situation for making profits in the future.

Capital budgeting is a continuous problem from which management never has respite. The problem of when to replace or to retire equipment is essentially a capital budgeting problem, as is the expansion of plan facilities. Some managements delegate these problems to subordinates or to chance, but the problems are nevertheless present and should be solved by using the best information and techniques available.

Time Shape of Cash Proceeds. One complication in budgeting capital expenditures arises because of the different time shapes of the cash proceeds of different assets.[1] An asset may promise to earn equal proceeds each period. Another may promise to earn greater cash proceeds in the early years than the later years, or just the opposite. The duration of the earning period is also a factor that must be considered. The complications arising because of the time shape of the proceeds is illustrated in the following table by different investment possibilities with the same cost.

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[1] Cash proceeds refers to the difference between revenues and the expenses that use funds.

Investment Possibility	Cash Proceeds in Year 1	2	3	4	5	Total Cash Proceeds
A	$200	$200	$200	$200	$200	$1,000
B	400	200	200	100	100	1,000
C	—	200	300	300	300	1,100
D	500	400	—	—	—	900

From the point of view of total income earned over its total life, investment C would seem to be the best investment, and investment D the worst investment. Is it possible that proceeds of $900 received in the first two years is more valuable than $1,000 received over a period of five years? The answer is "yes" if consideration is given to the fact that a dollar today may be more valuable than a dollar in the future. The cash proceeds of the first two years (the forecast for D) may be invested in various ways which would enhance their value, compared with the shape of proceeds possible with C. Assuming that each of the four assets has the same cost, the relative desirability of the four choices is established by determining and ranking the present values of the four different earning streams. Assume that the correct rate of interest is 4%.

n	Present Value of a Dollar Due in n Periods with a 4% Rate of Interest
1	$0.96
2	.93
3	.89
4	.85
5	.82

COMPUTATION OF PRESENT VALUE
OF THE CASH STREAM FOR INVESTMENT A

Year	Cash Proceeds	Present Value of a Dollar	Present Value of the Cash Proceeds
1	$ 200	$0.96	$192
2	200	.93	186
3	200	.89	178
4	200	.85	170
5	200	.82	164
Total	$1,000		$890

The present value of A's stream of cash proceeds is $890. The same types of computations for B, C, and D give the following results:

Investment	Present Value of Cash Proceeds, 4% Rate of Interest (all investments have the same cost)
A	$890
B	915
C	954
D	852

According to the preceding table, C is the best investment. The present value of C's cash proceeds, $954, is greater than the present values of A, B, or D's proceeds. If 8% is used as the discount rate instead of 4%, the following table is obtained:

Investment	Present Value of Cash Proceeds (using an interest rate of 8%)
A	$800
B	844
C	835
D	809

Using the 8% rate of interest, investment B becomes the best choice. This occurs because the early proceeds are being weighted more heavily than before (the later proceeds are discounted by a greater rate of discount). Investment D is now better than Investment A.

Present Value. Where the cost of the different investment possibilities are not equal, another step is required. It is necessary to find the present value of the cash flows. The cash flows would include the outlays as well as the proceeds.

Example

Accept or reject the following investment possibilities:

Investment	Cost of Investment	Present Value of Cash Proceeds	Net Cash Flows
A	$11,000	$10,000	($1,000)
B	5,000	6,000	1,000
C	4,000	8,000	4,000

Computation of the present value of the cash flows will not allow us to rank the investments, but we can decide whether to accept or reject an investment. The investments are rejected if the present value of the cash flows is negative (the outlays are greater than the proceeds). Investment B and C would be acceptable, but A would be rejected.

The primary problem in using the present value method is the choice of interest rate. Theoretically it should be the opportunity cost, i.e., the rate of return promised by the investment which would otherwise be undertaken. In certain cases the use of cost of capital is sound (if all investments with a rate of return greater than the cost of capital are accepted).

Rate of Return. The simplest way to illustrate what is meant by rate of return is to assume a situation where the investment is constant (there is no decrease in value) and the return from the asset is constant. Assume a situation where an investment of $100 will pay $5 a year for perpetuity. The rate of return is the ratio of income to investment.

$$r = \frac{5}{100} = 5\%$$

The rate of return may be defined as the rate of discount that equates the present value of the stream of future cash proceeds to the initial investment. This latter definition is not particularly useful in the simple case described above, but it is invaluable in the more complicated cases. In complicated situations the rate of return is best solved by trial and error. It should be remembered that the objective of the computations is to *determine that rate of interest which will equate the present value of the stream of cash proceeds with the cost of the investment.*

The rate of return of a capital investment is exactly analogous to the yield of a bond. In fact it would be correct to speak of *yield* of an investment rather than *rate of return.*

Assume that an asset cost $276.65 and that it is expected that the asset will earn $100 the first period and $200 the second period. What is the rate of return? The first estimate of the rate of return may be 4% (a reasoned guess), the second 6%, and finally the correct estimate of 5% is found by halving the difference between the estimated rates.

Year	Cash Proceeds	First Estimate 4%	Second Estimate 6%	Third Estimate 5%
1	$100	$ 96.15	$ 94.34	$ 95.24
2	200	184.91	178.00	181.41
Present Value of Cash Proceeds		$281.06	$272.34	$276.65

The first estimate of 4% is too low a rate of discount, as evidenced by the fact that the present value of the proceeds is greater than the cost of the asset, $276.65. In like manner the second estimate is too high, as evidenced by the fact that present value of the proceeds is less than the cost of the asset. The third estimate turns out to be the *rate of return,* since the present value of the cash proceeds is equated to the cost of the asset.

This procedure for computation of the rate of return could be carried out for all possible investments. The investments may then be ranked according to their projected rates of return. The question of which investments should be undertaken is resolved by choosing the investments with the higher rates of return.

The rate of return is frequently used to rank investments, but for several reasons the rankings will not be absolutely correct (even assuming that the cash proceeds are correctly forecasted). Most of the reasons are outside the scope of this text, but they include the problems of mutually exclusive investments, differences in lending and borrowing rates, and the implicit assumption made by rate of return that proceeds can be reinvested at the same yield (see the section on reinvesting cash proceeds).

The present value of cash flows procedure illustrated above has several advantages over the rate of return approach, since it is not subject to two of the three complications noted above (the common difficulty is differences in lending and borrowing rates which accompanies an imperfect capital market). For illustrative purposes the rate of return has generally been used in this text, not because it is superior to present value, but because it is more widely used and for many cases will give comparable results.

Determining Future Cash Proceeds—The Problem of Uncertainty. No matter which method is chosen as a means of making investment decisions, it is necessary to forecast the future cash proceeds. This has frequently been assumed to mean that the duration of the proceeds and the amount of the proceeds of each year would be forecasted. Thus if one asset promised a rate of return of 6% and another 5½%, the first asset would be the preferred investment. Unfortunately this analysis is incomplete, for it ignores the possibility that the expected proceeds may not be realized. For example, assume that the 5½% rate of return is for all practical purposes a certainty, and that while the 6% rate of return is probable, there is a good possibility that it will not be realized (for example, a 30% possibility that the rate of return will be zero). Which is the better investment? Obviously our answer will not be so conclusive now as it was before this latest bit of information was made available. While we may maximize our profits with the 6% investment, we will also be increasing the risk of not making any profits.

With what degree of certainty can we determine the probabilities of a certain rate of return being earned? The probability of earning 3% dollar income on a United States Series E Savings Bond, held to maturity, may be 100%. The probability of earning 10% on a machine lathe is harder to compute, since it is a function of general business conditions, degree of competition in the industry, technological progress, etc. All these items are difficult to predict, especially when the analyst is determining their effect in a specific area. Because of the difficulty in determining exact probabilities, the following general procedure is suggested as one possible solution:

1. Determine the most probable rate of return.
2. Determine the rate of return, assuming reasonably pessimistic assumptions.
3. Determine the rate of return, assuming reasonably optimistic assumptions.
4. Weight the three rates of return according to your best information, *or* use standard weights such as 50% for the most probable, and 25% for each of the optimistic and pessimistic predictions.
5. The sum of the three weighted rates of return will give a composite rate of return which may be used in rank investments.

Example

Investment A offers a rate of return of 5½%. For all practical expectations this rate of return is certain.

Investment B offers a rate of return of 6%. While this is the most probable rate of return, an analysis indicates that if the assumptions as to rate of activity and various other factors were changed, it could earn as high as 8% or as low as 1%.

Solution

	Rate of Return		Probability		Weighted Rate of Return
Optimistic Assumptions	8%	×	0.25	=	2.00%
Most Probable	6	×	0.50	=	3.00
Pessimistic Assumptions	1	×	0.25	=	0.25
Composite Rate of Return, Investment B					5.25%

This computation indicates that Investment A may be more desirable than Investment B. If the probabilities of the happening of various events are changed, then the ranking of the investments may also be changed. It should be realized that this is a rough tool, more similar to an axe than to a surgeon's scalpel.

Problem of Reinvesting the Cash Proceeds. It is possible to arrive at an incorrect solution to the capital budgeting problem if the complications arising because of the problem of re-investing the cash flow are ignored. Assume that the choice of investments lies between A and Z and that they have the following characteristics:

Investment	Year	Earnings	Cost of Investment	Rate of Return
A	1	$ 10.00	$100	10%
	2	110.00		
. .	. . . .	. . . .	. . . .	. . . .
Z	1	$100.00	$100	15%
	2	17.25		

According to the above facts, the best investment would be Z, since that investment promises the higher rate of return. The problem, however, is incomplete as stated. In order to make a truly informed decision, we should know how the capital available at the end of the first year is to be invested in the second year. If it can be invested only in a project that promises to yield 3%, the total cash accumulated at the end of the second year would be $120.25 for investment Z ($100 × 1.03 + $17.25). Investment A would accumulate to $120.30 ($10 × 1.03 + $110). Thus Investment A is a slightly better investment possibility than Investment Z, despite the fact that the rates of return offered by the two investments (ignoring the re-investment of cash proceeds) indicate the opposite.

Depreciation and the Ranking of Investments. A prime complication in the ranking of investments is the treatment of the depreciation of the asset being considered. If the investment in question is a piece of equipment with an estimated useful life of four years, should one-fourth of the cost of the equipment be considered as an expense in making the investment decision? The answer is *no.* It is *not necessary to subtract depreciation* from the revenues, since the cost of the asset is automatically taken into consideration. The present value of the cash proceeds are compared with the cost of the asset. Using this procedure avoids the arbitrary allocation of the cost of the asset over its useful life. It should be recognized that this treatment in no way argues against the allocation of depreciation for accounting purposes but is useful for the decision-making procedure illustrated in this section. Depreciation for tax purposes does affect the investment decision. This subject is reviewed in the section on income taxes.

Other Considerations. Up to this point in the chapter it has been assumed that investment decisions could all be solved on the basis of profit expectations. This is the general rule, but there are exceptions. Some investments must be undertaken in order to ensure continuity of operations. These "necessary" investments will not be subjected to a rate-of-return test. Another exception is the investments which are desirable but which do not directly earn profits. Examples of these are employee recreational centers, exhibits in museums, and training facilities. While these projects do not directly increase profits, they may nevertheless be desirable. A possible procedure for handling items of this nature is to rank them with profit-earning assets and then arrive at an answer to the question "which is more desirable, a rate of return of 5%, or a new employee swimming pool?" In this way all projects may be ranked and the most desirable investments chosen.

Replacement of Fixed Assets. A special case of investment decisions involves the timing of the replacement of fixed assets. Actually the procedure outlined for capital budgeting is equally applicable to the problem of when to replace fixed assets. The problem is not decided in a vacuum but is a part of the over-all problem of allocating scarce resources (funds available for investment).

Instead of computing the cash proceeds of each period, it is necessary to compute the *savings* resulting from using the new asset instead of the old asset. These savings can then be discounted back to the present and equated to the cost of the asset in order to find the rate of return.

One of the most confusing problems in this type of analysis is the treatment of depreciation. If the problem is solved in the manner recommended here, neither the depreciation of the new asset nor the depreciation of the old asset will be included. The cost of the new asset is already taken into consideration through the equating of the savings to the cost of the new asset. The book depreciation of the old asset is not relevant, since it is a sunk cost and will occur whether the asset is replaced or not. The decrease in salvage value of the old asset is relevant and should be taken into consideration.

Example

The cost of capital is 5%. If the rate of return is greater than the cost of capital, the asset should be replaced. The following facts are available:

	Old Asset	*New Asset*
Cost New	$10,000	$7,024
Book Value	$6,000	——
Estimated Useful Life	10 yr.	10 yr. (might be used longer)
Savings per Year (including labor, power, maintenance, etc.)		$1,000

Should the asset be replaced?

Solution: Find the rate of interest that will equate an annuity of $1,000 a year for ten years to the cost of the asset, $7,024.

$$\$1{,}000\ A_{\overline{10}|r} = \$7{,}024$$

$$A_{\overline{10}|r} = \$7.024$$

The rate of interest that will equate an annuity of $1 a year for ten years to $7.024 is *7%*. This may be obtained from tables. Thus the rate of return is greater than the cost of capital, and the asset should be replaced. Note that the cost or book value of the old asset did not influence the decision.

An alternative method is to compute the present value of the cash flows using the cost of capital as the rate of discount. The present value of the cash proceeds is $7,921 ($1,000 times the present value of a dollar a period for ten periods discounted at 5%). The present value of the outlays is $7,024, the cost of the investment. Since the present value of the proceeds exceeds the outlays the investment is desirable.

Assume that the *new asset* will have a salvage value equal to $690 at the end of ten years. This information complicates the solution, since the present value of the $690 plus the savings per year should be equated to the cost of the asset. The salvage of the new asset may be considered to *increase the savings* of the last year. The rate of interest that equates an annuity of $1,000 a period for ten periods and salvage of $690 available at the end of ten periods is 8%. Thus, the rate of return is 8%, and the old asset should be replaced.

Returning to the original problem, if the *old asset* has an expected *salvage value today* of $314 (and no value ten years hence), then the net cost of replacing the old asset will not be $7,024 but $6,710. The $6,710 is obtained by subtracting the present value of the salvage of the old asset, $314, from the cost of the new asset, $7,024. If the old asset has salvage value at the end of the ten years, then a possible treatment is to decrease the savings of the last year (since if the equipment is replaced, there will be no salvage of the old equipment in the tenth year) by the amount of the salvage expected in the tenth year, and then equate the yearly savings to the cost of the new asset *minus* the salvage value of the old asset today.

Income Taxes and Capital Budgeting. The preceding example bypassed the effect of corporate income taxes. There is no question but that corporate income taxes affect the incentive to invest in capital assets. Just what that effect is and the direction of the effect is the subject of some difference of opinion. Is a tax of 52% too high because it reduces the opportunity for making profits (the corporation can keep only $0.48 on every dollar of taxable income), and thus reduces the incentive to invest? Or is a tax of 52% actually an incentive to invest, since in the presence of other profitable activities the investment being considered can lose only $0.48 per dollar of investment (the tax loss would reduce taxes on other activities by $0.52 per dollar of loss)?

The two extremes are fairly easy to establish. With an income tax now of 0%, and no increase expected in the future, the investment decision would be entirely dependent on the amount of the future cash proceeds (as in the preceding example).

With an income tax now of 100%, and no decrease in taxes expected in the future, there would be no chance at all for a net profit, and there would be no incentive to invest. An income tax of 100% would result in a complete drying up of investments.

Now let us assume a tax greater than 0% and less than 100%. Is it possible to predict the effect of the income tax on the rate of return? To obtain a generalization, it will be necessary to assume that depreciation for tax purposes will be spread evenly over the useful life of the asset. With this assumption, the conclusion is that any increase in taxes will make an investment (otherwise profitable) less profitable, i.e., decrease the rate of return.

How does a decrease in the rate of return affect the total dollars of investment? A marginal investment whose rate of return was above the cut-off rate (that rate of return which determines whether an investment will be undertaken or not) will find its rate of return decreasing with an increase in the corporate income tax. Thus it is inevitable that some additional investments will now find themselves with lower rates of return than the cut-off rate. The larger the income tax, the more influence the tax will have on determining the rate of return.

Maximizing Profits or Minimizing Losses. The foregoing discussion has assumed that investment decisions are made based on the rate-of-return approach to the capital budgeting decision. This approach implicitly assumes that an attempt is being made to maximize profits. It is possible that a firm will be more impressed with the fact that its prospective losses are minimized. This is consistent with the comments that are often made "that this expenditure costs only $0.42; the government pays the rest because of reductions in income taxes."

A corporation with this point of view would be happiest with an income tax of 100%. Then, if it had sufficient taxable income, it could invest in any scheme with no chance of "losing." Any loss incurred would merely reduce income taxes and would in effect be paid by the government. This point of view is, of course, absurd, but nevertheless it is the reason why income taxes cannot be increased past *X*% (*X* representing that rate of tax which would lead a firm to waste resources, since the government is footing a large percentage of the bill, and the corporate share of the expenditure is very small).

While the statement that the government helps pay the expenditure has an element of truth, it also has a basic fallacy. That fallacy was brought out in the preceding section. An increase in income taxes will reduce the rate of return of an asset and will tend to discourage desirable investment decisions, not encourage them, as long as attention is focused on the possibility of making profits.[2]

Present Taxes and Future Taxes. A complication that should be incorporated into the analysis is the possibility of a future change in taxes. If the income tax rates are going to be different in the future, then these future tax rates will affect both the amount by which the cash savings will be taxed and the amount of tax saved as a result of using the cost of the investment as a deduction for tax purposes.

The prospect of tax changes downward, combined with the privilege of writing off depreciable assets at an accelerated rate, is especially stimulating to investment. This combination tends to minimize the possible loss, since the cost of the asset can be subtracted now for tax purposes at the high tax rate. The possibility of large gains is not removed, since the taxes in the future are expected to be decreased. Thus the ideal situation from the investor's point of view would be to have high taxes and be able to use accelerated depreciation (thus tending to minimize possible losses), while retaining the promise of reduced taxes in the near future, thus offering the prospect of profits in the future.

The Rate of Return Approach and Income Taxes—An Example. If income taxes are introduced into the analysis, it is necessary to *reduce* the cash proceeds by the amount of the income tax on the earnings generated by the investment and to *add* to the cash proceeds the income tax saved as a result of using the cost of the investment as a deduction for tax purposes.

If the straight-line method of computing depreciation is used for tax purposes, then the tax savings in each year of use will be equal. Since the passing of the 1954 revenue code, corporations have had more leeway in the choice of method used to write off depreciable assets. Any of the decreasing-charge methods of computing depreciation will cause the tax savings of each year to be unequal. Since these depreciation procedures are advantageous from a cash position point of view and should be used, they should also be used for the capital budgeting purposes. The result is to complicate the analysis to the extent of requiring that the solution to the problem of finding the rate of return becomes a matter of trial and error (testing different rates of return) rather than the simpler procedure of going to a table for the present value of an annuity.

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[2] This analysis is from the point of view of the individual firm and does not take into consideration any macro effects which a change in corporate income taxes may have.

Example

The cost of capital is 5%. The tax rate is 60%. The old asset is fully depreciated for tax purposes. The new asset will be depreciated for tax purposes using the straight-line method and a life of ten years.

No tax changes are expected in the future. Salvage value and removal of this type of asset are approximately equal.

	Old Asset	*New Asset*
Cost (new)	\$10,000	\$7,024
Estimated Useful Life	10 yr.	10 yr.
Savings per Year (labor, power, etc.)		\$1,000

Should the asset be replaced?

Solution

To solve this problem, it is necessary to determine the rate of return this asset will earn. What rate of discount will equate the cash proceeds to the cost of the new asset? There are actually two factors that must be considered: (1) the economic savings, and (2) tax savings.

Tax Saving:

Tax depreciation times the tax rate $= \frac{\$7{,}024}{10} \times 0.60 =$ \$421.44

Net Economic Saving:		
Economic Saving	\$1,000	
Less Tax on the Saving	600	400.00
Saving per Year		\$821.44

$$\$821.44\ A_{\overline{10}|r} = \$7{,}024$$

$$A_{\overline{10}|r} = \$8.55$$

The asset should not be replaced, since the rate of return (r) is slightly less than 3%. The 3% is obtained from tables, giving the present value of annuities. Note that the solution to this problem, when a zero tax rate was assumed, indicated a rate of return of 7%.

Controlling Capital Budget Expenditures. The capital expenditures should be controlled in the same general manner as manufacturing expenditures. Reports should be prepared which compare the actual expenditures with the amounts budgeted. Where the actual expenditures exceed the amount budgeted, explanations should be sought before further amounts are authorized for expenditure.

One of the most difficult tasks is the estimate of the progress toward completion of the project. Thus, if the authorized expenditure is $100,000 and $50,000 has been expended, this is no cause for alarm as long as the project is 50% completed or more. Where reasoned estimates cannot be made, it is better to indicate that the percentage of completion cannot be estimated than it is to undermine the management's faith in all the percentages of completion by making an unreasonable estimate.

Appraising the Results of the Decisions. Periodically, the results of the capital expenditure decisions should be reviewed. How far from actual realized earnings were the projected earnings? Were the estimates of service life and net salvage reasonable? While there are elements of chance connected with any projections, there are accepted methods of estimating the effect of various factors (such as population growth, shifts in habits of people, etc.) on the demand for products. The other variables can also be predicted. If the persons or person making the predictions are reasonably accurate, then they should be praised. If they consistently are incorrect, then a new source of information must be obtained. The decisions related to making capital expenditures are too important to be based on inaccurate information and faulty procedures.

Cash Payback Method of Capital Budgeting. The cash payback procedure is one of the most popular methods used to choose among different investment possibilities. The investments are ranked according to the length of time required for them to earn an amount of cash equal to their cost.

Example

Compute the cash payback period for the following investments:

Investment	Cost of Investment	Cash Proceeds per Year
A	$ 10,000	$2,000
B	100,000	5,000

The cash payback of Investment A is 5 years ($10,000 divided by $2,000). The cash payback of Investment B is 20 years ($100,000 divided by $5,000).

Many executives would argue that Investment A was a better investment than Investment B, since its payback period was much shorter. The absurdity of this approach may be shown by adding the additional information that Investment A has a life of 5 years and Investment B a life of 50 years. The payback approach ignores the useful life of the investment and also the time shape of the cash proceeds.

Limitations of Capital Budgeting Procedure. The procedures described in this chapter are useful, but they are sometimes difficult to apply. The foundation of the procedures is the assumption that the time shape of the future cash proceeds may be forecast. In many situations this is very difficult to do with any degree of certainty. Rather than setting up one schedule, it may be necessary for the analyst to make a whole series of schedules, each based on different assumptions. These schedules should be for a whole range of earning possibilities rather than for *one* shaky estimate. The objections to this type of analysis may be met by various means. We have here a tool that is useful when properly applied but which can be no better than the information it uses and the manner in which it is employed.

It was once hoped that the present value or rate of return techniques would offer simple solutions to the problem of making capital investment decisions. It is now obvious that these decisions are complex and that there is no one, simple, and correct answer to be obtained. But even at their worst the procedures outlined in these pages are a tremendous improvement over the "payout" approach and various other rules of thumb currently being used. The present-value or rate-of-return approach, intelligently applied, will be of assistance in making investment decisions, and all business managers should be familiar with the strengths and weaknesses of the procedures.

QUESTIONS AND PROBLEMS

34–1. Assuming a rate of discount of 4% (this is the cut-off rate of return), which of the following streams of cash proceeds is more desirable?

	Year			
Investment	1	2	3	4
A	$385			
B	195	$195		
C	100	100	$100	$100

Assume that the proceeds are earned on the last day of the year and that all the investments cost the same.

34–2. Five investment possibilities offer the following rates of return:

Investment	Rate of Return	Cost of Investment
A	5%	$40,000
B	8	20,000
C	10	50,000
D	12	40,000
E	20	20,000

Required

(a) Briefly explain how the rates of return were computed.

(b) If the cost of capital is 9%, and the firm uses cost of capital as the rate at which to cut off investment, which of the given investments should be undertaken?

34–3. This company uses 4% as the cut-off rate in determining which investments should be undertaken. For the following three investments determine the rate of return for each investment and determine which, if any, of the investments should be undertaken. Compute the rate of return to the nearest whole per cent.

Investment	Cost of Investment	Cash Proceeds in Year 1	2	3	4
A	$10,000	$ 2,700	$2,700	$2,700	$2,700
B	10,000	3,500	3,500	3,500	
C	10,000	10,300			

34–4. The following conversation may have taken place between a professor of accounting and a controller of a large corporation:

PROFESSOR: I am curious as to how you make capital budgeting decisions.

CONTROLLER: We use a combination of cash payback and other factors.

PROFESSOR: Do you take into consideration the rate of return?

CONTROLLER: Yes. Actually we take into consideration many factors.

PROFESSOR: What do you mean?

CONTROLLER: A large percentage of our capital budgeting decisions are not actual decisions. They just happen. For example, if the cafeteria of a plant needs enlarging, then it is enlarged without considering the rate of return. Also, if we find one of our products selling real well, and the plant capacity isn't large enough, then the plant is expanded.

PROFESSOR: In those decisions where cash payback and rate of return are used, how do you reconcile any conflicting results obtained from the computations?

CONTROLLER: Let me explain how we use the cash payback procedure. Let us assume that we can determine with a fair degree of accuracy the amount that a new capital project will cost. Estimates are then made of cash proceeds to be earned in each period. In this way we can determine in how many periods the asset will earn its cost.

PROFESSOR: How do you determine whether or not to replace a piece of equipment?

CONTROLLER: The savings from using the new process or new equipment is computed. The cash payback period is then computed in the manner described above. Of course the estimates of savings are subject to wide error. You should realize that to a great extent the capital budgeting procedure is a "bargaining" process. Each plant manager thinks his capital project is most important. The allocation of investment funds between plants is to some extent dependent on the plant manager's ability to state his case.

Required: Comment on the capital budgeting procedure used by this company.

34–5. The March Company is preparing its capital budget for the year 1958. One problem that has arisen is whether or not to replace three bolt-making machines presently in use by two more modern machines. The new machines will have the same total capacity, but they will result in labor saving, since one operator will be able to service both machines, whereas three operators were required for the old machines. There will also be a saving in material cost, since the new machines can use a type of wire which has not received the special treatment that was required for the old machines. A complete analysis of the facts revealed the following situation. The below information is based on operations of a normal level of activity.

	Old Machines	*New Machines*
Cost New (including installation)	$20,000	$160,000
Book Value (as of December 31, 1957)	$12,000	
Estimated Physical Life Remaining	10 yr.	10 yr. or more
Depreciation per Year	$1,200	$16,000
Labor Cost per Year	$26,000	$8,000
Material Cost per Year	$500,000	$495,000
Power	$5,000	$6,600
Maintenance	$4,500	$5,900

Assume that for both the old and new machines the forecasted removal cost and salvage are approximately equal.

The cost of capital and the investment cut-off rate for the March Company is 5%.

Required

(a) Compute the rate of return promised by the investment in the new machine (compute to the nearest whole per cent). Should the old machines be replaced? Explain briefly. Assume a zero tax rate.

(b) Compute the rate of return promised by the investment in the new machines, assuming a present (and expected) tax rate of 50%. The old machine is fully depreciated for tax purposes. The new machine will be depreciated by using the straight-line procedure over a ten year period.

34–6. The May Company is preparing its capital budget for the year 1957. A question has arisen as to whether or not to replace a machine with a new and more efficient machine. A complete analysis of the facts reveals the following situation. The below information is based on operations at a normal level of activity.

	Old Machine	*New Machine*
Cost New (including installation)	$40,000	$80,000
Book Value (as of December 31, 1957)	$30,000	
Estimated Physical Life Remaining	10 yr.	10 yr.
Depreciation per Year	$3,000	$8,000
Labor Cost per Year	$15,000	$5,000
Material Cost per Year	$350,000	$345,000
Power per Year	$2,000	$4,500
Maintenance per Year	$5,000	$7,500
Interest Cost of Borrowing Funds to Finance the Purchase	——	$3,200

The income tax is currently 52% of taxable income. The old asset is fully depreciated for tax purposes. The new asset will be depreciated by using straight-line depreciation and a usfeul life of ten years.

Assume that for both the old and new machines the forecasted removal cost and salvage are approximately equal.

The cost of capital and the investment cut-off rate for the May Company is 5%.

Required

(a) Compute the rate of return promised by the investment in the new machine (compute to the nearest whole per cent). Show all computations.

(b) Should the old machine be replaced? Explain briefly.

(c) Compute the rate of return, assuming the income tax rate to be zero.

34–7. This company uses 4% as the cut-off rate in determining which investments should be undertaken. Assume that the proceeds are to be earned on the last day of the year. Which investments should be accepted?

Investment	Cost of Investment	Year 1	Year 2	Year 3
A	$8,000	$10,400		
B	2,000	1,000	$1,000	$1,000
C	600		1,082	

34–8. Many companies use the following general procedure for making capital budgeting decisions:

1 Investment	2 Cost of Investment	3 Cash Proceeds per Year	4 Cash Payback Period (Col. 2 divided by Col. 3)
A	$10,000	$ 2,000	5 yr.
B	20,000	2,000	10 yr.
C	50,000	10,000	5 yr.

Required: Comment on the procedure indicated, assuming that investment decisions are based on the information given in Column 4 (the shorter the payback period, the better the investment).

34–9. The Tone Company must choose between two investment possibilities. One is a government project on a cost-plus basis which promises a rate of return of 6%. The second project is a manufacturing plant which will require the same amount of capital as the government project. The following schedule is prepared for the president of the company.

Assumed Average Level of Activity (as a per cent of capacity)	*Rate of Return Projected from Operating New Plant*
25%	1%
50	5
75	10
100	20

Required: Should the Tone Company invest in the government project or the new plant?

35

Inventories and a Changing Price Level

THE PROBLEMS OF accounting for inventories with a changing price level are among the more interesting problems the accountant must face. The choice of a procedure (there are many from which to choose) can turn a profit into a loss or a loss into a profit. Rules of reporting prevent the accountant from changing procedures without disclosure, and it should not be assumed that companies constantly change their inventory accounting procedures. However, at the same moment in time, companies in the same industry will use different procedures which cause their incomes to be noncomparable without adjustment.

In the period following World War II, many companies shifted to LIFO because of the possible tax savings. The use of LIFO resulted in the more recently purchased, higher priced goods being charged against the revenues of the period. This had the result of lowering incomes, thus lowering the federal income tax. The effects that the use of LIFO had on the financial reporting (both on the income statement and the position statement) were largely ignored. It is these questions that are reviewed in this chapter.

The Flow of Costs—FIFO and LIFO. Just as the *physical flow* of the materials through the plant is dependent on the material handling procedures, the flow of the *costs* of the inventories through the accounts is dependent on the choice of accounting procedures. Usually the first materials purchased are used or sold first. This could argue that the costs of the oldest materials should be charged to expense first, since this costing procedure generally agrees with the physical flow of materials. This assumption of cost flow is called *first-in first-out* and is commonly referred to as "FIFO."

Illustration of FIFO

January 1 Inventory, 100 units @ $2.00 = $200
Purchases during January, 100 units @ $2.50 = 250
$450

Assume that 100 units were used during the period. Each unit was priced at $2.00 per unit and the transfer from inventory was $200. If more than 100 units were used, the first 100 units would have been priced at $2.00 and the remaining units would have been priced at the purchase price of the next batch, $2.50.

The prime objection to the FIFO assumption of the flow of costs is that the *oldest* costs are charged against the revenues. These are likely to be costs which were incurred in the preceding period. With a changing price level these oldest costs will not reflect the true expense of gaining the revenues.

Continuing the example, assume that the 100 units were sold for $2.25 per unit (total revenues were $225) and that there were no other expenses. The income statement would appear as follows:

Sales	$225
Costs of Goods Sold	200
Income	$ 25

Note that with a FIFO flow of costs, an income of $25 is reported. If the firm started the period with $100 of cash, how much cash will it have at the end of the accounting period (assuming the purchases of material are paid for with cash)? The sales brought in $225 of cash, the replacement of the goods sold cost $250; thus the cash on hand decreased $25 while the physical units of inventory remained unchanged. Is it useful for the accountant to report an income of $25 at the same time as the total real assets of the firm actually decrease? At the beginning of the period the company had at its disposal 100 units of product and $100 of cash. At the end of the period, after an income of $25, the company had 100 units of product and $75 of cash. This occurred because the FIFO system of measuring the flow of costs causes the income figure to *include the results of market gains and losses.*[1] There is a need for the accountant to break up the income figure as reported into two segments: "Operating Income," which measures the efficiency of operating management; then, by adding the market gain or subtracting the market loss, to obtain the "Net Income," which measures the change in the stockholders' equity (in some situations the market gain or loss may be used to measure the efficiency of the purchasing officer).

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[1] Market gains or losses may arise from fluctuations in the general price level (in which case the market gains or losses are fictitious) or from changes in the specific price of the product being sold (in which case the market gains or loss are real, since this company has benefited or suffered a loss when compared with the remainder of the economy).

The first step toward accomplishing this objective is to use a "last-in first-out," or "LIFO," assumption as to the flow of costs. This accomplishes the objective of having the most recent costs matched against the revenues of the period, and it also *eliminates* the so-called market profits from the income.

Continuing the above example, the cost of goods sold, following a LIFO assumption as to the flow of costs, is 100 units priced at $2.50, or $250. The income statement then becomes:

Sales	$225
Cost of Goods Sold	250
Loss	($ 25)

The income of the period now appears to be a loss of $25. This is consistent with the decrease of the cash balance to $25 while the company was merely maintaining its inventory in terms of physical units. The disadvantages of LIFO become apparent when one focuses attention on the ending inventory figure. The amount remaining in the material account would be $450 minus the $250 charged to cost of goods sold, or $200. This seems to be inadequate reporting, since there are 100 units on hand and the most recent purchase price was $2.50 per unit. This seems to indicate that the inventory valuation should be $250 (which it was, following FIFO) instead of the $200 obtained by following LIFO.

LIFO–FIFO and the Statement of Financial Position. It is interesting to compare the position statements that result from using the FIFO and LIFO procedures for costing inventories.

Financial Position:

As of January 1, Using Either Procedure		As of December 31, Using FIFO	As of December 31, Using LIFO
Cash	$100	$ 75	$ 75
Inventory	200	250	200
	$300	$325	$275
Owners' Equity	$300	$325	$275

Using FIFO, the inventory presented on the position statement is $250. This is the cost of the most recently purchased inventory. Usually the inventory resulting from the use of FIFO will be a close approximation to replacement cost, especially if the inventory turns over rapidly. In any event a FIFO inventory will reflect recent costs in all cases except those situations where the inventory moves very slowly.

Using LIFO, the inventory valuation at the end of the year becomes $200 (100 units at $2.00 per unit). The last goods purchased are charged as cost of goods sold first; thus the costs of the oldest goods remain as inventory. This is unrealistic because the oldest goods were probably sold first, and there is no sound theoretical reason for valuing the ending inventory by using the costs of units already sold. These costs will bear little relationship to what similar goods will cost on December 31. If this problem were carried forward, unless the firm arrived at a year-end date with no inventory, the costs of a portion of this inventory would be carried on the books period after period at the same per unit cost.

If the $250 figure is accepted as the actual cost of the inventory on hand, then the inventory using LIFO is actually *$50 less than the goods cost.* If the assets are understated by $50, then the owners' equity is understated by an equal amount. Actually the owners' equity is understated by the amount of the market gain not recognized, since LIFO is being used.

This difficulty may be resolved by making the following journal entry.

Inventory	$50	
Equity Adjustment-Market Gain		$50
To adjust the inventory to current prices and record the market gain		

The inventory is then stated at the most recent purchase price and the cost of goods sold is measured in terms of the most recent costs. The income statement will then appear as follows:

Sales	$225
Cost of Goods Sold	250
Net Operating Loss	(25)
Market Gain	550
Net Income	$ 25

This procedure combines the best of the FIFO system with the best of the LIFO system. The final net income is the same as obtained from using FIFO, but an important decision-making subtotal is also developed. The ending inventory figure, instead of being a hodgepodge of meaningless costs accumulated in the distant past (as is done with LIFO), represents current values. Actually it is easy to use replacement costs for valuation of the ending inventory instead of most recent purchase prices. This will make the ending inventory figure even more meaningful. Unfortunately, while FIFO and

LIFO are both generally accepted by accountants, the procedure developed here is not currently acceptable. For the present it is useful as a theoretical model and as a device to point out what the accounting for inventory flow could accomplish but does not.

The objection of the practicing accountant to the scheme discussed here rests on the question of whether the "Equity Adjustment—Market Gain" should be recognized or not. It is argued that the goods have not been sold and therefore the gain should not be recognized. *It is generally agreed that gains not realized by sale should not be recognized.* To satisfy this objection, the credit can be made to an account "Equity Adjustment—Unrealized Market Gain." Using the preceding example for making the entry at the end of the accounting period, we have:

Inventory	$50	
Equity Adjustment—Unrealized Market Gain		$50
To adjust the inventory to current prices and record the adjustment to the stockholders' equity		

If in the next period the price level continues to increase, a similar entry will be made to bring the inventory up to the current price level. If in a subsequent accounting period the price level decreases, and the LIFO inventory is actually more than it should be, using current prices, then a write-down of inventory will be in order. The credit will be to "Inventory" and the debit to "Equity Adjustment—Unrealized Gain." Assume that it is necessary to write down the inventory $40. The entry would be as follows:

Equity Adjustment—Unrealized Market Gain	$40	
Inventory		$40
To adjust the inventory to current prices and record the adjustment to the stockholders' equity		

If the write-down to inventory is greater than the balance in the equity adjustment account, then the debit will be made to a loss account (loss arising from price decline). Why can a loss account be debited to record a market *loss* while a gain account cannot be credited to record a market *gain*? This is simply an accounting convention. Record losses when they occur (even though they may not have been realized by the sale of the goods), since this is "conservative." Do not recognize gains, since this is not "conservative." The question may well be asked, "What is the basic nature of the equity adjustment—unrealized market gain account?" It is basically the same account as equity adjustment—market gain, but the concession is being made to accounting practice not to recognize as income "unrealized" gains. Thus the unrealized market gain account will appear in the stockholders' equity section of the position statement, but the gain will not appear in the income statement of the period. The attempt to compromise serves only to point up the weakness of present accounting conventions relative to accounting for inventories.

Summary: FIFO vs. LIFO. Using FIFO, are market gains recognized? Using LIFO, are realized gains unrecognized (look at the preceding ending inventory understatement)? To the first question the answer must be that the gain which is described as a "market gain" is recognized when using FIFO, even though it is buried in cost of goods sold by reducing the cost of goods sold below the *current cost* of the goods sold. Using LIFO, there is an understatement of assets and stockholders' equity (in a rising price level), as illustrated by the failure of the inventory figure to represent significant figures. This suggests a failure to recognize an economic change which has occurred, namely, an increase in the dollar value of the inventory.

Generally the inventory valuation resulting from the use of LIFO will be far removed from any indication of current values or even the actual costs of the physical inventory on hand. Thus the use of LIFO weakens the statement of financial position because it results in a misstatement of inventory and also a misstatement of the stockholders' equity.

If LIFO gives a bad static picture, does it make up for this shortcoming by presenting a significant income statement? The answer to this question is only a qualified "yes." The LIFO procedure is to be praised when it matches current costs with the revenues of the period. It fails, however, since it ignores the market gain or loss. This market gain or loss (the gain or loss arising from holding inventory during a period of changing prices) is relevant financial information and it should be reported. LIFO also fails to match current costs and revenues when part of the LIFO inventory (the inventory at the time of adoption of LIFO) is used.

If LIFO is bad (as the discussion implies), is FIFO good? The answer must again be a qualified "yes." FIFO gives a reasonable position statement. The use of replacement cost may improve the presentation in certain cases, but in general, FIFO is adequate when the resulting position statement is the criterion. However, FIFO fails to present a cost-of-goods-sold figure which represents a realistic cost of sales where there has been a change in prices. The costs matched against the period's revenues are not current costs but costs carried forward from the preceding period. The result is an income figure that includes the market gain or loss buried in with the operating income (in fact, it is buried in the cost of goods sold). The burying of this market gain or loss is objectionable. The failings of FIFO and LIFO can be remedied relatively simply by computing the cost of goods sold (using LIFO), and then adjusting the inventory to a FIFO basis or current-cost basis. The amount necessary to adjust the inventory is debited or credited to an equity adjustment account (the exact title being dependent on the interpretation of this market gain).

Average Cost. The possibilities open to the accountant do not end with FIFO and LIFO. One of the most popular alternatives is a weighted average, inventory-pricing system. The total units available for sale during the period were 200 units which had a total cost of $450. The average cost per unit was $2.25. Using this average cost to price the goods sold gives a figure of $225 for cost of goods sold. The income statement appears as:

Sales	$225
Cost of Goods Sold	225
Income	$–0–

The use of average costs is a compromise procedure that has all the basic advantages and disadvantages of FIFO and LIFO, but these are softened somewhat by the use of averages. It does nothing to solve the basic problem, i.e., with the same situation the accountant may come up with an income of $25 (FIFO), a loss of $25 (LIFO), and no profit or loss (Average Cost). There are actually other alternatives that will give even different answers (replacement cost, basic stock procedure, highest-in first-out, unweighted average, specific identification of costs, etc.). There are some who argue that the measurement of business income is an impossible task. The variety of answers obtained following generally accepted principles seems to support that contention. However, this author is not so pessimistic. There may not be a "one correct income," but there are some income computations that seem to be more correct than others.

The Inventory Valuation Adjustment. Economists and others are very much interested in the gross national product of the country, i.e., the total goods and services produced, and the distribution of that product in the form of dividends, wages, interest, etc. One of the sources of their information are reports prepared by accountants for purposes different from those for which they are used by the economists; thus there are several adjustments which must be made.

Since an attempt is being made to measure the goods and services *produced,* the change in inventory must be added (if inventories have increased) to the sales of the period. The book inventory changes cannot be accepted for this purpose because these changes will not reflect the change in *physical* inventory when the company uses a FIFO accounting procedure. The same is true if LIFO is used and the inventory decreases.

Example

The following entries illustrate the need for adjustment in a company using FIFO.

January 1 Inventory, 100 units @ $3	$ 300
Purchases, 400 units @ $2	800
	$1,100
Ending Inventory (FIFO), 130 units @ $2	$ 260

The book inventory change is a decrease of $40 despite the fact that the physical inventory increased by 30 units. This inconsistency is corrected by valuing the physical change of 30 units by the most recent prices. Thus the inventory change will be 30 × $2, or an increase of $60.

The economist is also interested in extracting the "market profits or losses" from the reported profits. If sales in the preceding example were $1,480, the reported income would be:

Sales		$1,480
Cost of Goods Sold,		
100 @ $3	$300	
270 @ $2	540	840
Income		$ 640

It has been shown previously that the FIFO procedure includes market gains or losses. To this the economist would agree. To remove the market gain or loss, the goods sold should be priced at the purchase prices of the period. This will give an income statement as follows:

Sales	$1,480
Cost of Goods Sold,	
370 @ $2	740
Income	$ 740

To adjust the reported income, following FIFO, it is necesary to add $100 to the reported income (or subtract $100 from the cost of goods sold). This adjustment is also equal to the amount by which the book inventory change had to be adjusted in the example. The technical title of this amount is "Inventory Valuation Adjustment." In affect, the following journal entry is being made:

Inventory change	$100	
Income		$100

To adjust income to eliminate the market loss and to cause the inventory to reflect the physical change in inventory. Actually the credit should be to an "Inventory Valuation Adjustment" account.

The need for the journal entry may also be shown by using "T" accounts. The explanation for entry (1) is the same as for the preceding journal entry.

Inventory

Beginning Inventory $300	

Income

	Reported Income $640

Inventory Change

Purchases	$800	Goods Used	$840
(1)	100		

Inventory Valuation Adjustment

	(1) $100 (to be added to the reported income)

The actual computation of the "Inventory Valuation Adjustment" made by the Department of Commerce is somewhat different from that given here because of refinements. Index numbers are used to implement the adjustment, and average prices are used instead of most recent prices. Nevertheless the basic nature of the adjustment is comparable to that indicated by the above entries.

Accountants should increase their awareness of how the information they prepare will be used by social scientists. This will help to improve the reporting and also tend to ensure that the information prepared will be properly used.

QUESTIONS AND PROBLEMS

35–1. The Emerson Company

On January 1, 1957, the position statement of the Emerson Company was as follows:

Cash	$10,000	Stock Equity	$30,000
Inventory	20,000		
	$30,000		$30,000

The inventory consisted of 10,000 bushels of Grade I winter wheat.

During the year the Emerson company engaged in two transactions. It sold all of its 10,000 bushels of inventory for $2.50 per bushel. It replaced its inventory by buying 10,000 bushels of identical wheat for $2.80 per bushel. The current replacement price of wheat of this type was $2.90.

The controller of the firm prepared the following income statement and position statement:

EMERSON COMPANY

INCOME STATEMENT FOR THE YEAR ENDING
DECEMBER 31, 1957

Sales	$25,000
Less Cost of Sales *	20,000
Income	$ 5,000

* Assuming a FIFO flow of goods.

EMERSON COMPANY
POSITION STATEMENT AS OF
DECEMBER 31, 1957

Cash	$ 7,000	Stock Equity	$35,000
Inventory	28,000		
	$35,000		$35,000

Required

(a) Prepare income statements, using LIFO, average value, and replacement cost for valuation of inventory.
(b) Prepare position statements for each of the two income statements.
(c) Evaluate the income statements and position statements arising from each of the three procedures.

35–2. The Even Flow Company uses a periodic inventory procedure. The following information is obtained from its records:

	Units	*Dollars*
January 1, Opening Inventory	100	$200
January 10, Purchases	40	100
January 25, Purchases	100	300

A physical inventory discloses that there were 100 units on hand on January 31. At that date the replacement cost of the material was $3.25 per unit.

Required: Complete the following table:

	Ending Inventory	*Cost of Goods Sold*
(a) FIFO		
(b) LIFO		
(c) Average Cost		
(d) Replacement Cost		
(e) A LIFO system that also presents a significant inventory figure for the balance sheet		
(f) Give journal entries necessary for implementing (d)		
(g) Give journal entries necessary for implementing (e)		

35–3. The Foulball Company has the following items on the equity side of its position statement between the current liabilities and stock equity sections:

Reserve for Inventory Losses, Obsolescence	$100,000
Reserve for Inventory Losses, Price Decline	$200,000

Investigation discloses that the first item was created by a charge to a loss account. It was created because special raw material purchased for a customer who went out of business has value only as scrap. The scrap value is approximately equal to the cost of disposing of it.

The "Reserve for Inventory Loss, Price Decline" was created because the president of the firm feared that prices were too high and he wanted to be sure that the firm had sufficient assets to weather the storm. The debit for the entry creating this account was to "Retained Earnings."

Required: Make any journal entries required to improve the accounting for the given information.

35–4. General Electric Company

The notes to the 1955 financial statements of General Electric Company contained the following item: [2]

> *Note 3.* Inventories at substantially all locations were verified by physical count during the latter part of the year. Inventories are carried at cost (exclusive of certain indirect manufacturing expenses) which was not in excess of market value. Cost of substantially all inventories is determined on a last-in-first-out (LIFO) basis, less reserves which (a) make provision for possible losses on inactive and excess stocks, and (b) eliminate unrealized intercompany profits. Heretofore, the inventory of tungsten was the only item valued on the last-in-first-out basis. Other inventories were priced on a first-in-first-out basis and an additional reserve was provided, which had the effect of accounting for the inventory of copper substantially in accordance with the base stock principle. The adoption of the LIFO method resulted in a charge to income of $20,271,000 on a net after-tax basis. This charge was offset by the return to income of certain inventory reserves provided in prior years which were no longer required. Additional comments on this subject appear on page 22.

The following explanation was found on page 22:

> LIFO Method of Inventory Accounting Adopted
>
> The last-in-first-out, or LIFO, method of valuing inventories was adopted by the Company effective January 1, 1955. This method is based on the concept that a continuing quantity of inventory is necessary for the operation of a business. By maintaining this quantity of inventory at a constant price level, the higher costs of current replacements during periods of price increases are matched against current selling prices. As a result, earnings more nearly reflect the effect of current costs.
>
> Costs of materials, especially copper, showed substantial increases during 1955, and future rises in costs of materials seemed probable. In addition, the employee program developed in 1955 provides for wage increases over a five-year period. The LIFO method was adopted because of the desirability of reflecting these increasing costs in the computation of current earnings.
>
> In general, except for tungsten stocks, the first-in-first-out, or FIFO, method was used for inventories prior to 1955. A simplified comparison

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[2] Reprinted by permission of the General Electric Company.

of the two methods during periods of rising costs may be made as follows:

	Former Method: FIFO	*Present Method: LIFO*
Used for Valuing Inventory:	Higher current costs	Lower earlier costs
Charged against Income:	Lower earlier costs	Higher current costs

During periods of rising costs the LIFO method results in lower inventory valuations. By matching higher current costs against current income, LIFO also results in lower income during periods of cost inflation. During periods of declining prices, the reverse is true.

As a result of this new procedure, the Company's 1955 net earnings were reduced $20 million. As previously mentioned, the LIFO method gives lower inventory valuations in periods of rising prices. As these lower valuations are put into effect, certain inventory reserves provided in prior years will no longer be required. Return of such reserves to income in 1955 approximately offset the effect on net earnings of the LIFO revaluation.

Required

(a) Comment on the company's reasons for shifting to LIFO and its comparison of FIFO and LIFO.

(b) Comment on the $20 million offset to the additional charge against income. What entries did the company probably make to set up the reserve? What entries did the company make in 1955? (The inventories are shown as net reserves on the statement of financial position.)

35–5. The Overall Company

The Overall Company uses a FIFO procedure to account for inventory. The following information relates to the year 1957:

January 1, Inventory	200 units @ $7 per unit
Purchases during the Year	1,300 units @ $3 per unit
December 31, Inventory	400 units

The income statement of The Overall Company was as follows:

Sales, 1,100 units @ $6		$6,600
Cost of Goods Sold:		
200 @ $7	$1,400	
900 @ $3	2,700	4,100
Income		$2,500

Required

(a) What is the book change in inventory?
(b) What is the physical change in inventory?
(c) What is the physical change in inventory valued at most recent prices?
(d) What would have been the cost of goods sold if the units sold had been valued at the most recent prices?
(e) For purposes of determining this firm's contribution to gross national product, what would be the inventory change? What adjustment would have to be made to the income (this is the inventory valuation adjustment)?
(f) Prepare the journal entry which is in effect being made by the inventory valuation adjustment.
(g) Did the Overall Company suffer a market gain or loss during the period? What amount?

36

Depreciation and the Measuring of Income with a Changing Price Level

THE MEASURING OF corporate income during periods of severe fluctuation in the general price level has been a pertinent issue in accounting circles for the past 40 years. The inflation after World War I, the deflation and depression of the 1930's, the inflation following World War II, and the inflation caused by the Korean War have made thoughtful accountants reconsider the accounting assumption of a stable monetary unit.[1] There have been few years in which price fluctuations have not significantly distorted the corporate income reports prepared in accordance with generally accepted accounting procedures.

The arguments of those who are against the issuance of financial statements that show adjustments to reflect changes in the price level have been strengthened by the apparent lack of interest on the part of businessmen in general. There is a reasonably good explanation for this apathy. Corporate managements, by and large, had justification for believing that their companies were prosperous in the decade following World War II. If they recognized the presence of inflation at all, they claimed to take it into consideration in making their decisions. The magical process by which they could systematically do this without actually making the detailed computation has never been explained. Unless the computations are made, the decisions of management will be based on incomplete and inaccurate information.

At the time of purchase, cost is a significant figure. In a normal arm's length transaction, cost indicates the economic value of the asset purchased. In the case of fixed assets, which are used over a period of years, the cost figures lose their significance as an indication of value as the years progress.

If unadjusted historical cost and unadjusted depreciation are of limited use, then they should be adjusted so that they become more useful. The argument that recorded costs are objectively determined, while the adjustments are a matter of opinion, is no more valid than not accruing any depreciation because the useful life of fixed assets is a matter of conjecture. It is better to revise cost figures of limited use on the basis of judgment than to use depreciation computations in situations for which they are not valid. Costs adjusted on the basis of changes in the general price level should be thought of as historical costs brought up to date. To be significant in an economic sense, the costs must be expressed in terms of dollars of the same purchasing power as the revenues.

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[1] The Wholesale Price Index was 65.0 in 1926, 42.1 in 1932, and 110.1 in 1953 (1947, 1948, 1949 = 100).

Measuring Corporate Income. The accountant defines income as the difference between revenues and the sum of expenses and losses associated with the obtaining of those revenues. With a stable price level, recorded dollars may well be used to measure revenues and to measure expenses. Income is obtained by a simple subtraction. With a fluctuating price level the significance of the results of the accountant's computations becomes more limited.

If an income statement states that the depreciation of fixed assets is six million dollars, what is the significance of this figure? It measures that portion of the original cost of the asset, unadjusted for changes in the price level, which has expired during the period. To be economically significant, depreciation should be expressed in present-day dollars. The revenues must be compared with the costs of obtaining those revenues. The assumption that the accountant can show on his income statement the same depreciation charge with a rising price level as with a falling or a stable price level is a theoretically weak assumption. It ignores the fact that the value of the dollar may change radically.

Matching revenues with the applicable expenses is a concept that is especially important in analyzing accounting information under conditions of inflation, since the purpose of the adjustment to depreciation for the change in the value of the dollar is to match expense dollars against revenue dollars with the same purchasing power. This is merely a logical extension of a theory which the accountant already makes use of, namely, matching expenses with revenues.

Depreciation and Replacement. There is general agreement that depreciation is a necessary subtraction from revenues in order to obtain an income figure, but there is less agreement as to the exact nature and significance of the depreciation charge. There is some confusion as to the relation between depreciation and replacement of fixed assets. Depreciation accounting is only indirectly connected to the problem of replacing fixed assets. How do we reconcile this view with the statement that, in a period of inflation, business fails to maintain its capital because it is charging inadequate depreciation? As stated before, there is no direct relation, yet there is a vital indirect relation which should be recognized.

The direct function of depreciation is not to provide a replacement fund but to measure the cost of using long-lived assets. Cash is generated by making sales, not by charging more or less depreciation. Depreciation has no direct effect on current assets except for that small fraction of depreciation which works its way into ending inventories in the case of a manufacturing firm. Charging less than normal depreciation will result in an inflated income, but there will be no proportionate increase in the funds of the corporation. In fact there are several indirect repercussions which may cause the funds available to be decreased. It is these indirect effects that must be considered in order to understand fully the effect of depreciation policy on the ability of a corporation to maintain its productive capacity and the purchasing power of its assets.

Depreciation policies, in conjunction with the institutions of administered prices, taxation of income, public utility rate regulation, labor demands for higher wages based on the ability to pay, and the stockholders' demands for higher dividends in the presence of undistributed earnings, do indirectly affect the ability of a corporation to replace the capital assets being used. The depreciation that is allowed as a tax deduction does influence the fund position of the firm. Likewise, to the extent that costs as computed by businessmen will determine price, to the extent that ability to pay determines wages, to the extent that income determines dividend distribution, depreciation charges will affect the fund position of a corporation.

In the case of the public utilities the relevance of depreciation to replacement is even more obvious. Prices are regulated on the basis of a fair rate of return. Thus the size of the depreciation charge has a direct relationship to the ability of a public utility to replace fixed assets, since the revenues will be a function of the depreciation charge.

The foregoing discussion does not alter the fact that the primary and recognized purpose of depreciation is not to provide for replacement of depreciable assets but to allocate the cost of a capital asset over its useful life.

Adjustment of Depreciation: Using an Appraisal. The adjustment of depreciation and the cost of long-lived assets may be implemented by the use of index numbers or by appraisal. The prime disadvantage of the appraisal method is that it relies upon human judgment and thus is apt to be inconsistent from locality to locality and from time period to time period. The appraisal method is useful, however, to illustrate the basic procedure for adjusting long-lived assets and depreciation.

Example

Assume that a building cost $100,000 and had an expected life of 40 years. After the beginning of the eleventh year, an appraisal revealed that the current replacement cost of the building was $300,000 but that the original estimate of useful life was correct.

The following accounts record the entries required to reflect the appraisal and the first year's depreciation accrual after the appraisal.

Building

√	$100,000		
(1)	200,000		

Retained Earnings

			xxxx

Building, Allowance for Depreciation

		√	$25,000
		(1)	50,000
		(2)	7,500

Equity Adjustment, Appraisal

(3)	$5,000	(1)	$150,000

Depreciation

(2)	$7,500		

Realized Gain from Increase in Value of the Building

		(3)	$5,000

Explanation of Entries

(1) Records the increase in value to the building (debit building $200,000), the increase in the allowance for depreciation to record the fact that the building is 25% depreciated (credit the allowance for $50,000), and the increase in the stockholders' equity resulting from the good fortune of holding a building which increased in dollar value (credit an adjustment to stockholders' equity for $150,000).

(2) Records the year's accrual for depreciation. The amount is equal to 2.5% of the adjusted building.

(3) Records the recognition of 1/30 of the adjustment as being realized; thus the credit is to a realized gain account. This entry is, in effect, the second half of entry (2).

It should be noted that the net effect of these entries to the stockholders' equity is zero, since the depreciation (a subtraction from revenues) has been increased by $5,000, and the realized gain (an addition to the income for the period) is also equal to $5,000. The justification for this procedure is that it makes additional information available to management and others attempting to make decisions.

In the preceding problem there was no change made in estimated service life. Often there will also be a change in the service life which requires further adjustment to the allowance for depreciation. If, in the example, the service life had been increased to 50 years, the opening balance in the allowance account would have been written down to 20% of the cost of $100,000, or $20,000 (debit the allowance for $5,000), and the retained earnings would have been increased by $5,000 (credit retained earnings). The credit to the allowance for depreciation to record appraisal value of the asset would only be for $40,000 (20% of the adjustment of $200,000).

Adjustment Using Index Numbers. The use of index numbers to adjust the cost of long-lived assets and depreciation has the advantage of being more objective than appraisals. Each company would be using the same index series each year; thus the reader of financial reports would know what adjustment was being made. This discussion assumes the use of a general price index. The argument over the use of specific price indexes and general price indexes is unrewarding. Each type of computation has its uses. The use of a general price index finds its rationale in the argument that we are attempting to convert the costs of the assets purchased in different years into dollars of common purchasing power, i.e., to eliminate the effects of the *general inflation.*

Example

Assume that the X Company has purchased buildings in the following three years:

Year	Cost	Estimated Life	Rate of Depreciation
1932	$ 50,000	50 yr.	2 % per yr.
1940	75,000	25 yr.	4 per yr.
1955	200,000	40 yr.	2.5 per yr.

The general price index series for the applicable years is as follows (the wholesale price index may be used as an approximation of the general price index series).

Year	Price Index	Factor to Convert to 1955 Dollars
1932	50	$\frac{250}{50} = 5.0$
1940	100	$\frac{250}{100} = 2.5$
1955	250	$\frac{250}{250} = 1.0$

Compute the depreciation adjusted for changes in the price level for the year 1955.

Solution

Year of Purchase	(1) Unadjusted Cost	(2) Factor to Convert to 1955 Dollars	(3) Adjusted Cost (1) × (2)	(4) Depreciation Rate	(5) Adjusted Depreciation (3) × (4)
1932	$ 50,000	5.00	$250,000	2 %	$ 5,000
1940	75,000	2.50	187,500	4	7,500
1955	200,000	1.00	200,000	2.5	5,000
	$325,000		$637,500		$17,500

The unadjusted depreciation would be $9,000 (2% of $50,000 + 4% of $75,000 + 2.5% of $200,000). Thus the adjustment to depreciation necessary to convert the unadjusted depreciation into dollars of purchasing power equal to the dollars of revenues earned during the period is $8,500. The journal entry to record the depreciation cost for the period might be as follows:

Depreciation Cost	$17,500	
Building Allowance for Depreciation		$9,000
Stock Equity Adjustment		8,500

This procedure adjusts the depreciation for the period, but it does not adjust the cost of the fixed asset. It is an incomplete procedure, although it does accomplish the objective of adjusting the depreciation cost of the period. A more complete procedure could be used which would adjust the building account and the allowance for depreciation. This procedure would be the equivalent to the procedure illustrated for the appraisal adjustment. It will not be illustrated here because it would merely obscure the computation for the adjusted depreciation which is the main function of the computation.

Note that the depreciation cost, adjusted for price changes, is $8,500 greater than it would be if an unadjusted original cost were used. Thus the operating income will be decreased by an equal amount. The credit for the $8,500 is to a "Stockholders' Equity Adjustment" account. What is the basic nature of this credit of $8,500? It is a gain that accrues to the stockholders because they held fixed assets during a period of inflation. It is not a real gain if the stockholders' position is merely being maintained in real terms. (If the stock equity were $100,000 in 1940 and $100,000 in 1955, would the stock equity be maintained in real terms?) It may be a real gain to the stockholders if there is long-term debt outstanding, but this is a complicated question upon which the accounting profession is not in agreement. The net result to the stockholders' equity from this entry is to leave their position unchanged (the depreciation is increased and the adjustment or gain is increased by an equal amount). Despite the fact that the net effect is zero, the entry is important because of the different significance of the depreciation cost, a deduction from revenues, and the adjustment to the stockholders' equity which does not affect the operating income.

Appraisal of Desirability of Adjusting Depreciation. This chapter has argued that adjustments to depreciation for changes in the price level are desirable; in fact they are necessary for purposes of measuring income. The reader should note the qualification made here. For purposes of *measuring income,* it is necessary to adjust depreciation for changes in the price level. Does this mean that adjusted depreciation should be used for public utility rate regulation and for income tax determination? To these questions the answer is less clear cut. For example, allowing adjusted depreciation for tax purposes may be business-cycle intensifying (all other things being equal, adjusted depreciation would reduce corporate tax payments, thus giving corporations more funds to spend during periods of inflation; this would tend to make the inflation more severe). The questions of public utility regulation, income taxes, and income measurement are all too complicated for one simple answer to be given here. The reader should realize that in periods of changing prices, the accountants' reports lose some of their reliability. There are many accountants who believe that the recorded data should be adjusted to indicate the change in the price level.

QUESTIONS AND PROBLEMS

36–1. Assume a building cost $200,000 and had an expected life of 20 years. After the beginning of the eleventh year an appraiser revealed that the current replacement cost of the building was $400,000. The estimated life of the asset remained at a total of 20 years.

Required

(a) Set up "T" accounts to record the situation immediately before the appraisal.
(b) Record the appraisal.
(c) Record the depreciation for the year.
(d) Set up a new set of "T" accounts. Record the given information and the additional fact that the building is estimated to have 30 more years of use.

36–2. Assume that the Power Utility has purchased buildings and equipment in the following years:

Year	Cost	Estimated Life	Index of General Prices
1932	$ 25,000	40 yr.	50
1940	50,000	25 yr.	100
1947	100,000	20 yr.	150
1955	125,000	25 yr.	250
1957	50,000	10 yr.	300

Required

(a) Compute the depreciation charge for 1957, based on unadjusted original cost. Assume that all assets were purchased on January 1 in the year in which they were acquired.

(b) Adjust all the plant and equipment costs into 1957 dollars. Compute the depreciation for 1957 in terms of 1957 dollars.

(c) Record the depreciation charge for the year 1957, using as the base for computing depreciation the original cost adjusted into 1957 dollars.

(d) The revenues for the period were $80,000; fuel expense, $15,000; labor expense, $10,000; taxes, $20,000. Prepare an income statement, using the adjusted depreciation.

36–3. The 1954 Annual Report of the United States Steel Corporation [2] included the following:

> The money that industry spends for plant and equipment is important to a high level of employment. Not only does this money result in employment of those who produce the facilities, but once the facilities are installed they provide the continuing jobs of operating them. Stop such capital expenditures and not only is creation of new jobs cut off, but existing jobs are imperiled as existing facilities become worn out or obsolete and are not replaced. The factors impairing or encouraging capital expenditures for facilities are of vital importance.
>
> One of the principal sources of funds spent for facilities is the money recovered through the wear and exhaustion cost of existing facilities—often called depreciation. This depreciation in any period represents that portion of the capital originally expended which is used up in the production of products in such period. Depreciation is properly regarded as a cost that is deductible in determining taxable income. Inadequate depreciation is a direct threat to capital expenditures and to employment.
>
> With regard to the adequacy of depreciation we are faced with a disturbing fact: Since World War II, depreciation amounts as ordinarily calculated and recognized in tax laws have been quite insufficient to buy new facilities as fast as existing ones have been wearing out or becoming obsolete. These amounts have failed to perform their vital revolving-fund function of maintaining the supply and modernness of the tools of production.
>
> The reason is this: The total number of dollars that can be recovered in depreciation over the life of a given facility is limited to the number of dollars originally expended for the facility. But the buying power of the dollar has not remained at all stable. According to the *Engineering News-Record,* it now takes $2.60 to buy as much construction as could be purchased for $1.00 in 1940. The buying power of the dollar during the years since 1940 has shrunk to 40 per cent of what it was. The deprecia-

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[2] Reprinted by permission of the United States Steel Corporation.

tion dollars recovered today, based on the dollars spent many years ago for facilities, are simply not enough dollars to replace those facilities—not enough dollars to equal the buying power originally expended for those facilities.

The other principal source of funds, aside from borrowing or from selling stock, that corporations have to modernize or purchase tools of production is income reinvested. If depreciation does not recover enough buying power, the income "after taxes" may have to be drawn upon to make up the difference if expenditures for facilities are to be sufficient to maintain the aggregate tool life of the concern.

This is unfair and unfortunate because it results in the taxation of capital. Thus, if depreciation cost is understated in current buying power, then income is correspondingly overstated. If the income tax rate is 50 per cent, then two additional dollars must be secured from customers to have one additional dollar after taxes to spend on facilities. This is tax absorption of the circulating flow of capital funds required to maintain the supply and modernness of the nation's tools of production.

Required

(a) Comment on the statement "money recovered through the wear and exhaustion cost of existing facilities—often called depreciation." Is depreciation a source of funds?

(b) Discuss the validity of the statements quoted. Is there some justification in the claim of United States Steel that unadjusted depreciation is inadequate? Should depreciation be adjusted for changes in the general price level for tax purposes? For purposes of measuring income?

36–4. The following letter was published in the *New York Times:*[3]

Your editorial of Jan. 5 laments the plight of business firms which are permitted to deduct for tax purposes a depreciation allowance which "only" covers the original cost of plant and equipment, although the cost of replacing such assets when they wear out may be much greater. You conclude with the surprisingly intemperate statement that Congress is led principally by "pure political demagogy" to refuse to permit depreciation allowances based on replacement cost.

Contrary to your view, historical cost is the only reasonable basis for tax depreciation. The use of replacement cost would be unsound and undesirable. The corporation profits tax is computed on the excess of income over costs.

Most costs—labor, materials—are deducted when they occur. Costs of capital goods are deducted as they are used up, after they are bought.

The company which must replace a $10,000 machine with a $20,000 machine does not lose out in taxes—they may claim higher depreciation allowances for the more expensive machine as it wears out. (Firms seldom replace a machine with another identical model, anyway—the new one is frequently improved.)

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[3] At the time of this letter the letter writer was an Associate Professor of Economics at Kenyon College. Reprinted by permission of Professor Trescott and the *New York Times.*

Depreciation calculations based on replacement cost would give a totally unjustified windfall to many firms—particularly the large, well-established firms who already enjoy so many strategic advantages from the tax system. Using replacement cost would be particularly lucrative for firms which have borrowed to finance capital goods. For them the excess of replacement cost over original cost would be a tax-free money profit.

You are certainly correct when you state that business firms need more access to capital. There are many legitimate ways in which the Government could promote this, including beneficial changes in the tax laws (such as a reduction in the corporate tax rate).

But sleight-of-hand with depreciation allowances does not meet the requirements of equitable taxation.

PAUL B. TRESCOTT
GAMBIER, OHIO, JAN. 8, 1957

Required: Discuss the validity of the arguments presented.

36–5. The following items were extracted from Accounting Research Bulletin No. 43 of the American Institute of Certified Public Accountants (Chapter 10, pp. 67–68):[4]

> The committee recognizes that business management has the responsibility of providing for replacement of plant and machinery. It also recognizes that, in reporting profits today, the cost of material and labor is reflected in terms of "inflated" dollars while the cost of productive facilities in which capital was invested at a lower price level is reflected in terms of dollars whose purchasing power was much greater. There is no doubt that in considering depreciation in connection with product costs, prices, and business policies, management must take into consideration the probability that plant and machinery will have to be replaced at costs much greater than those of the facilities now in use.
>
> When there are gross discrepancies between the cost and current values of productive facilities, the committee believes that it is entirely proper for management to make annual appropriations of net income or surplus in contemplation of replacement of such facilities at higher price levels.
>
> It has been suggested in some quarters that the problem be met by increasing depreciation charges against current income. The committee does not believe that this is a satisfactory solution at this time. It believes that accounting and financial reporting for general use will best serve their purposes by adhering to the generally accepted concept of depreciation on cost, at least until the dollar is stabilized at some level. An attempt to recognize current prices in providing depreciation, to be con-

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[4] Reprinted by permission of the American Institute of Certified Public Accountants.

> sistent, would require the serious step of formally recording appraised current values for all properties, and continuous and consistent depreciation charges based on the new values. Without such formal steps, there would be no objective standard by which to judge the propriety of the amounts of depreciation charges against current income, and the significance of recorded amounts of profit might be seriously impaired.
>
> It would not increase the usefulness of reported corporate income figures if some companies charged depreciation on appraised values while others adhered to cost. The committee believes, therefore, that consideration of radical changes in accepted accounting procedure should not be undertaken, at least until a stable price level would make it practicable for business as a whole to make the change at the same time.

Required: Comment on the recommendation of the American Institute of Certified Public Accountants (six members of the committee dissented to the adoption of this section).

36–6. The statement is sometimes made that it really does not make a difference how depreciation is computed. Explain why (or why not) the question of depreciation computation is (or is not) important.

36–7. The following items were extracted from Accounting Research Bulletin No. 43 of the American Institute of Certified Public Accountants (Chapter 10, p. 73):[5]

> DEPRECIATION ON APPRECIATION
>
> Historically, fixed assets have been accounted for on the basis of cost. However, fixed assets in the past have occasionally been written up to appraised values because of rapid rises in price levels, to adjust costs in the case of bargain purchases, etc. In some of these instances companies have continued to compute depreciation on the basis of cost.
>
> When appreciation has been entered on the books, income should be charged with depreciation[6] computed on the written-up amounts. A company should not at the same time claim larger property valuations in its statement of assets and provide for the amortization of only smaller amounts in its statement of income. When a company has made representations as to an increased valuation of plant, depreciation accounting and periodic income determination thereafter should be based on such higher amounts.

Required: Assume that an asset which cost $10,000 is appraised in 1957 and found to have a value of $25,000. Record the appraisal and the depreciation for the year in accordance with the ARB 43. The life of the asset is 25 years. As of December 31, 1957, the asset is 6 years old.

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[6] The word *depreciation* is used here in its ordinary accounting sense and not as the converse of *appreciation.*

37

Common Dollar Accounting

Adjustment of All Accounts for Changes in the Price Level

In previous chapters the problem of dealing with price fluctuations as they affected depreciation and inventories has been discussed. This chapter discusses a general solution to the problem of accounting for changes in the price level.

The general effects of inflation on the financial condition of an individual are well known. If the person has money claims, he suffers from inflation, if he owes money (others have claims against him) he benefits, at least insofar as his asset-debt position is concerned. The opposite effect will happen when the price level declines. These effects have largely been ignored in corporate accounting, although the theoretical tools are available for making adjustments.

There are actually two problems that face the accountant. One is the adjustment of all revenues and operating expenses into dollars of the same purchasing power. This will enable the operating income to be computed undistorted by changes in the price level. The second problem is to compute the gain or loss from being a debtor or creditor.

The following simple example illustrates a procedure that may be used to accomplish these objectives. It should be recognized that this procedure, while advocated by many accountants, is not currently accepted by the accounting profession.

Example

All items are to be converted into year-end dollars.

Date of Index	*A Fictitious Index of the General Price Level*
December 31, 1940	100
December 31, 1954	150
December 31, 1955	200

The first step will be to convert a position statement dated January 1, 1955, into year-end dollars. The building was purchased on December 31, 1940.

	Jan. 1, 1955, Position Statement in Recorded Dollars		Factor		Jan. 1, 1955, Position Statement in December 31, 1955, Dollars
Cash	$30,000	×	$\frac{200}{150}$	=	$ 40,000
Building (net of Depreciation)	60,000	×	$\frac{200}{100}$	=	120,000
	$90,000				$160,000
Current Liabilities ...	15,000	×	$\frac{200}{150}$	=	20,000
Stock Equity	75,000				140,000 *
	$90,000				$160,000

* This is a residual computed by subtracting the liabilities from the total assets.

The monetary items are multiplied by the factor 200/150 in order to convert them into year-end dollars. For example, $40,000 of cash in year-end dollars would have the same purchasing power as $30,000 in beginning-of-the-year dollars. The building balance is multiplied by 200/100, since the asset was purchased in 1940 when the price level was 100. The stock equity is found by subtracting the current liabilities from the total assets.

The next step is to compute the gains or losses on monetary items for the year 1955. In this example there are only two monetary accounts, cash and current liabilities. The only transactions were sales of $17,500 (all in cash) and the accrual of $5,000 depreciation (based on unadjusted original cost).

Cash Account
(Conventional Accounting)

Jan. 1 Balance	$30,000	
Jan. 1–Dec. 31	17,500	No Disbursements
Dec. 31 Balance	$47,500	

Cash Account
(Common Dollar Accounting)

$\$30{,}000 \times \frac{200}{150} =$	$40,000	
$17{,}500 \times \frac{200}{175} =$	20,000 *	
Expected Balance =	$60,000	
Actual Book Balance =	47,500	
Monetary Loss =	$12,500	

* It is assumed that sales were made evenly throughout the year.

This amount of $12,500 represents the loss in purchasing power resulting from holding cash during a period of raising prices.

Current Liabilities
(Conventional Accounting)

	Jan. 1 Balance $15,000 No Entries

Current Liabilities
(Common Dollar Accounting)

	$15,000 × $\frac{200}{150}$	=	20,000
	Actual book balance	=	15,000
	Monetary Gain	=	$ 5,000

The amount of $5,000 represents the gain in purchasing power resulting from being in debt during a period of rising prices.

The net monetary gain or loss should be computed.

Gain from Being in Debt During a Period of Inflation	$ 5,000
Loss from Holding Cash	12,500
Net Monetary Loss	($ 7,500)

The next step is to adjust the conventional income statement into common dollars.

	Recorded Dollars (Conventional Accounting)		Adjustment Factor		December 31 Dollars (Common Dollar Accounting)
Sales (assumed to have been made at midyear)	$17,500	×	$\frac{200}{175}$	=	$20,000
Less Depreciation Expense	5,000	×	$\frac{200}{100}$	=	10,000
Net Operating Income	12,500				10,000
Monetary Gains (Loss)	—				(7,500)
Net Income	$12,500				$ 2,500

The next step is to compare the opening account balances in year-end dollars with the ending account balances *in year-end dollars.*

ASSETS			EQUITIES		
	Jan. 1	*Dec. 31*		*Jan. 1*	*Dec. 31*
Cash	$ 40,000	$ 47,500	Current Liabilities	$ 20,000	$ 15,000
Building	120,000	110,000	Stock Equity	140,000	142,500
	$160,000	$157,500		$160,000	$157,500

The increase in stock equity, $2,500, is equal to the change in stockholders' equity obtained from the income statement. This acts as a proof of the mathematical accuracy of the computations. The December 31, 1955, balance in the stock equity account may be obtained either by subtracting the liabilities from the total assets or by adding the net income from the income statement to the January 1 balance of the stock equity account (not the book balance but the balance with all items expressed in December, 1955, dollars).

Appraising the Technique. The procedure outlined in the preceding section, unlike conventional accounting, takes into consideration the effect of the change in purchasing power on monetary items as well as adjusting non-monetary items. Common dollar accounting tells a more complete story of the financial condition of a company as it moves between two points in time than any other procedure.

However, there are some disadvantages to common dollar accounting. The procedure is complex. Even in this very simple example, several pages had to be used to explain the steps. The bookkeeping procedures can get very involved when common dollar accounting is used. Another important criticism is that reports become more complicated and require expert interpretation. These criticisms have enough validity to warrant consideration. Accounting reports should be kept simple so that they can actually accomplish their goal of communication. A third criticism is that common dollar accounting focuses attention on the monetary items, reporting the gains or losses in terms of these items. Actually this is only part of the story. The monetary gains can arise only when the assets are in the form of items that can appreciate in value as the price level increases. Assets of this nature are land, natural resources, buildings, equipment, and inventories.

With a creeping inflation, the distortion caused by adherence to unadjusted original cost for purposes of computing depreciation and inventory procedures that bring old costs into the income statement may well be the prime enemies. If inventory or depreciation policies are brought into line, the largest part of the distortion will have been eliminated. This may well be the best immediate goal of the accounting profession.

QUESTIONS AND PROBLEMS

37–1. The Michigan Corporation

COMPARATIVE POSITION STATEMENTS

	January 1, 1956	*December 31, 1956*
Cash	$10,000	$ 4,750
Accounts Receivable	11,000	37,250
Inventories	20,000	41,000
	$41,000	$ 83,000
Fixed Assets	$33,000	$ 33,000
Less Allowance for Depreciation	(11,000)	(12,050)
	$22,000	$ 20,950
Total Assets	$63,000	$103,950
Current Liabilities	$20,000	$ 51,500
Stockholders' Equity	43,000	52,450
Total Equities	$63,000	$103,950

Transactions for the year included the following:

1. Sales of $52,500 (all on account)
2. Merchandise Cost of Goods Sold, $42,000
3. Collection of Accounts Receivable, $26,250
4. Purchase of Inventory (on account), $63,000
5. Payment of Accounts Payable, $31,500
6. Depreciation of $1,050, accrued

The income statement for 1956 was as follows:

Sales		$52,500
Less:		
Cost of Goods Sold	$42,000	
Depreciation	1,050	43,050
Income		$ 9,450

The Michigan Corporation uses a FIFO procedure in accounting for inventories.

An index of the general price level indicated the following:

Year	*Price Index* (a fictitious index of the general price level)
January 1, 1940	55
January 1, 1956	100
January 1, 1957	110

All transactions are assumed to have occurred evenly throughout the year at an average price level of 105 (the average of 100 and 110).

All fixed assets were purchased on January 1, 1940.

Management desires supplemental statements that eliminate the effects of the changes in the general price level.

Required

(a) Prepare comparative position statements for January 1 and December 31, 1956, where all items are expressed in December 31, 1956, dollars. (Dollars of different purchasing power are converted into dollars of the same purchasing power.)

(b) Compute the gain from being in debt and the loss from holding monetary assets (the monetary gain or loss).

(c) Convert all income statement items into dollars of the same purchasing power. Prepare an income statement that not only shows the operating income but also the monetary gain or loss.

(d) The stock equity, of January 1, 1956, obtained in part (a) plus the income computed in part (c) should equal the stock equity of December 31, 1956, obtained in part (a).

37–2. The Uprite Company

COMPARATIVE POSITION STATEMENTS

	January 1, 1957	*December 31, 1957*
Cash	$ -0-	$15,000
Inventories	10,000	8,000
	$10,000	$23,000
Accounts Payable	$ 6,000	$ 9,000
Stockholders' Equity	4,000	14,000
	$10,000	$23,000

Transactions for the year consisted of the following:

1. Merchandise Purchased Evenly throughout the Year, $3,000
2. Sales for Cash, $15,000
3. Cost of Merchandise Sold (on a FIFO basis), $5,000

The conventional income statement was as follows:

Sales	$15,000
Less Cost of Goods Sold	5,000
Income	$10,000

An index of the general price level indicated the following:

Date	*A Fictitious Index of the General Price Level*
January 1, 1957	100
December 31, 1957	200

Assume that all sales and purchases were made at an average of the period's beginning and ending price indexes.

Required

(a) Prepare comparative position statements for January 1 and December 31, 1957, where all items are expressed in December 31, 1957, dollars.
(b) Compute the monetary gain or loss.
(c) Prepare an income statement that shows all items in dollars of year-end purchasing power. This statement should include the monetary gain or loss and a reconciliation of the changes in the stock equity.

*

Appendix

Table A

Present Value of $1

$$A = (1 + r)^{-n}$$

Periods n	1%	2%	3%	4%	5%	6%	7%	8%
1	0.99010	0.98039	0.97087	0.96154	0.95238	0.94340	0.93458	0.92593
2	.98030	.96117	.94260	.92456	.90703	.89000	.87344	.85734
3	.97059	.94232	.91514	.88900	.86384	.83962	.81630	.79383
4	.96098	.92385	.88849	.85480	.82270	.79209	.76290	.73503
5	.95147	.90573	.86261	.82193	.78353	.74726	.71299	.68058
6	.94205	.88797	.83748	.79031	.74622	.70496	.66634	.63017
7	.93272	.87056	.81309	.75992	.71068	.66506	.62275	.58349
8	.92348	.85349	.78941	.73069	.67684	.62741	.58201	.54027
9	.91434	.83676	.76642	.70259	.64461	.59190	.54393	.50025
10	.90529	.82035	.74409	.67556	.61391	.55839	.50835	.46319
11	.89632	.80426	.72242	.64958	.58468	.52679	.47509	.42888
12	.88745	.78849	.70138	.62460	.55684	.49697	.44401	.39711
13	.87866	.77303	.68095	.60057	.53032	.46884	.41496	.36770
14	.86996	.75788	.66112	.57748	.50507	.44230	.38782	.34046
15	.86135	.74301	.64186	.55526	.48102	.41727	.36245	.31524
16	.85282	.72845	.62317	.53391	.45811	.39365	.33873	.29189
17	.84438	.71416	.60502	.51337	.43630	.37136	.31657	.27027
18	.83602	.70016	.58739	.49363	.41552	.35034	.29586	.25025
19	.82774	.68643	.57029	.47464	.39573	.33051	.27651	.23171
20	.81954	.67297	.55368	.45639	.37689	.31180	.25842	.21455
40	.67165	.45289	.30656	.20829	.14205	.09722	.06678	.04603

Table B

Present Value of $1 per Period

$$A_{\overline{n|}r} = \frac{1 - (1 + r)^{-n}}{r}$$

Periods n	1%	2%	3%	4%	5%	6%	7%	8%
1	0.99010	0.98039	0.97087	0.96154	0.95238	0.94340	0.93458	0.92593
2	1.97040	1.94156	1.91347	1.88609	1.85941	1.83339	1.80802	1.78326
3	2.94099	2.88388	2.82861	2.77509	2.72325	2.67301	2.62432	2.57710
4	3.90197	3.80773	3.71710	3.62990	3.54595	3.46511	3.38721	3.31213
5	4.85343	4.71346	4.57971	4.45182	4.32948	4.21236	4.10020	3.99271
6	5.79548	5.60143	5.41719	5.24214	5.07569	4.91732	4.76654	4.62288
7	6.72819	6.47199	6.23008	6.00205	5.78637	5.58238	5.38929	5.20637
8	7.65168	7.32548	7.01969	6.73274	6.46321	6.20979	5.97130	5.74664
9	8.56602	8.16224	7.78611	7.43533	7.10782	6.80169	6.51523	6.24689
10	9.47130	8.98259	8.53020	8.11090	7.92137	7.36009	7.02358	6.71008
11	10.36763	9.78685	9.25262	8.76048	8.30641	7.88687	7.49867	7.13896
12	11.25508	10.57534	9.95400	9.38507	8.86325	8.38384	7.94269	7.53608
13	12.13374	11.34837	10.63496	9.98565	9.39357	8.85268	8.35765	7.90378
14	13.00370	12.10625	11.29607	10.56312	9.89864	9.29498	8.74547	8.24424
15	13.86505	12.84926	11.93794	11.11839	10.37966	9.71225	9.10791	8.55948
16	14.71787	13.57771	12.56110	11.65230	10.83777	10.10590	9.44665	8.85137
17	15.56225	14.29187	13.16612	12.16567	11.27407	10.47726	9.76322	9.12164
18	16.39827	14.99203	13.75351	12.65930	11.68959	10.82760	10.05909	9.37189
19	17.22601	15.67846	14.32380	13.13394	12.08532	11.15812	10.33560	9.60360
20	18.04555	16.35143	14.87747	13.59033	12.46221	11.46992	10.59401	9.81815
40	32.83469	27.35548	23.11477	19.79277	17.15909	15.04630	13.33171	11.92461

Table C

Future Value of $1 per Period

$$s_{\overline{n|}r} = \frac{(1+r)^n - 1}{r}$$

Periods n	1%	2%	3%	4%	5%	6%
1	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060
3	3.030	3.060	3.090	3.121	3.153	3.184
4	4.060	4.122	4.184	4.246	4.310	4.375
5	5.101	5.204	5.309	5.416	5.526	5.637
6	6.152	6.308	6.468	6.633	6.802	6.975
7	7.214	7.434	7.662	7.898	8.142	8.394
8	8.286	8.583	8.892	9.214	9.549	9.897
9	9.369	9.755	10.159	10.583	11.027	11.491
10	10.462	10.950	11.464	12.006	12.578	13.181
11	11.567	12.169	12.808	13.486	14.207	14.972
12	12.683	13.412	14.192	15.026	15.917	16.870
13	13.809	14.680	15.618	16.627	17.713	18.882
14	14.947	15.974	17.086	18.292	19.599	21.015
15	16.097	17.293	18.599	20.024	21.579	23.276
16	17.258	18.639	20.157	21.825	23.657	25.673
17	18.430	20.012	21.762	23.698	25.840	28.213
18	19.615	21.412	23.414	25.645	28.132	30.906
19	20.811	22.841	25.117	27.671	30.539	33.760
20	22.019	24.297	26.870	29.778	33.066	36.786
40	48.886	60.402	75.401	95.026	120.800	154.762

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